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EDUCATION AND THE INDIVIDUAL

PRINCIPLES OF EDUCATION FROM THE PSYCHOLOGICAL STANDPOINT

BY

ARTHUR J. JONES

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TO MY WIFE

ETHEL LOUISE JONES

PREFACE

The purpose of this book is to give teachers who have not had the opportunity for extended work in psychology and education an understanding of the principles underlying the process of education. The attempt has been made to present these principles as simply as possible, without the use of technical language and terminology. This is always a dangerous undertaking, for it is often impossible to express a technical meaning correctly in general terms. Some of the expressions used may, therefore, be misinterpreted. In spite of this danger, it was thought worth while to make the attempt, because the need for a clear understanding of the fundamental principles involved in teaching is so great, especially for those directly concerned with teaching. A wealth of illustrations is also used in order to make clear the application of the principles to schoolroom situations.

If it helps teachers to get a better understanding of what education really is and what its objectives are, and to secure a clear idea of how to accomplish these objectives, the effort will be well repaid.

The inspiration for the book and the point of view from which it is written came from Edward L. Thorndike, who has inspired so many men and women not only by the example of his own work, but by his unfailing personal help and guidance. Acknowledgment

is also given to my colleagues in the School of Education of the University of Pennsylvania for their encouragement and personal help, and to Frank P. Graves, Commissioner of Education of New York, who has been unfailing in his assistance and inspiration.

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EDUCATION AND THE INDIVIDUAL

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CHAPTER I

INTRODUCTION

The Conditions Essential to Efficient Work

The Factors in Improvement.—Joy in the consciousness of work well done and knowledge that this work is actually of service are the supreme rewards of the worker. All progress of any kind grows out of a continued desire to improve conditions; no progressive worker is without this desire. But the difficulties in the way of improvement seem at times to be almost insurmountable. This is especially true of the work of the teacher. The question consciously and still more frequently only half-consciously framed by the teacher is "How can I improve my work?" Some are fortunate in having intelligent, sympathetic supervisors with powers of analysis sufficient to enable them to find what is wrong and sufficient tact and ability to show the teacher how to improve, but most teachers are not so fortunate. In any case the steps necessary to actual improvement must be taken by the individual teacher.

One common difficulty is that the problems of the teacher are thought of as problems peculiar to teaching, of a different kind from those encountered elsewhere. This is fundamentally untrue. The same principles hold for the work of the teacher as for that of any other worker. The reason that they have not until recently been applied to formal education in the school is that we have thought of education as a thing separate from life, involving processes widely different from those used in our ordinary activities. We are coming to see clearly the unity of thought processes, of habit formation, of the development of ideals, of achievement in all forms of human activity whether in the more or less formal work of the school or in the exacting conditions in the factory, the shop or the laboratory. The variations that occur are not in the essential factors but in the ends to be reached and in the processes involved.

Great help may be obtained by considering teaching as like any other job and attempting to study it in the light of our experience with other jobs.

First, then, let us consider the conditions essential to improvement when the worker deliberately sets out to improve his work. Careful study has shown that there are three factors essential to such improvement: (1) A consciousness of purpose, which involves a clear idea of the end to be reached and the reason for reaching it, (2) Some understanding of the process or processes necessary to reach the desired end, and (3) A sense of personal responsibility for reaching this end. These are the conditions essential to all efficient learning and especially to improvement in any line of work.

Illustrations

A few illustrations from daily life may serve to make clear the importance of these factors and their place in the accomplishment of daily tasks.

Consciousness of Purpose.—The successful accomplishment of any task in life, whether it be writing a letter or making an inaugural address, building a subway or establishing a League of Nations, is dependent, very largely, upon a clear, definite aim of what is to be done. The clearer and more definite the aim, the more surely and effectively it can be achieved.

When a housewife starts to cook she must know what it is she is to make; whether it is to be a loaf of bread, an omelet, or a plum-pudding. Otherwise she will not know what materials to select or what methods to adopt, and the product would probably be unfit to eat. The cabinet-maker must know before he begins whether he is to make a table, a chair, or a music cabinet. If he does not, he will waste valuable material and time, and accomplish nothing.

When we start out on a journey we must know where we want to go or we will not know what train to take or when we have arrived. Some inventions have been the result of accidents, but the great majority have been the result of careful, painstaking effort over a considerable period of time, always with a definite end in view.

But it is not enough to see the end to be reached; this will seldom, if ever, result in the expenditure of effort to reach it. There must also be a consciousness of some reason for reaching it. Before effort is ex-

pended there must be the feeling that, for some reason or other, it is desirable or necessary to accomplish the end. The cook must have a reason or purpose in making the bread or omelet or pudding. This may be any one of a number of reasons. She may herself be hungry; some member of her family may be in need of this food; she may wish to sell it; or she may simply take pleasure in cooking. But for some reason she feels that it is worth doing.

The cabinet-maker also is conscious of some reason or purpose that impels him to make a chair, a table, or a music cabinet. Before we start on a journey, we feel that for some reason it is worth while for us to take the trip. This may be because we want to visit a friend, because of business reasons, or even because of a desire to be on the move, to change scenes, or because we like to ride on the train.

A Knowledge of Principles and Processes.—While consciousness of purpose is, initially, of the utmost importance, yet even this is not sufficient to ensure success in accomplishment. Trips to the moon, to Venus, to Mars have been discussed for generations, and stories have been written describing such visits. Here the consciousness of purpose is present. The end is clearly seen and the purpose of the trip is clear. It would be vastly worth while from the standpoint of scientific investigation and discovery, of curiosity, of the lure of the mysterious, of the spirit of daring, of the attractiveness of danger. But we do not go; we do not even attempt to go. The chief reason is that we have no knowledge of the process by which we can make the trip. Some have advocated a huge rocket or

a super "Big Bertha" as the best means of getting beyond our atmosphere and the dominating attraction of the earth. But even if these were effective there are a thousand other obstacles to be overcome before the task can even be attempted. The cook could accomplish nothing without a knowledge of the materials to be used and the various processes involved in making the desired product.

This knowledge of the process to be used need not be at the outset of the undertaking, and, indeed, often is not as clear as knowledge of the end to be reached. In many cases the chief difficulties encountered in reaching an end are involved in the discovery of the correct principles rather than in the ignorance of the process to be used. It is, however, true that before one begins on a task there should be some idea of the process necessary to its completion. This is clearly seen in the development of the heavier-than-air flying machine. In this case, the end was clear and distinct and the worth-whileness of its accomplishment also clearly felt. The difficulty was in the principles involved and in the process to be used. Darius Green is typical of thousands, probably, who followed the example of Dædalus and imitated the method of flight of birds by flapping the wings. These attempts met with disaster even in the mythical case of Icarus. It was not until Langley utilized another method of the flight of birds, that of soaring, that the successful process was discovered. This involved the upward pressure of a column of air upon a fixed horizontal wing or plane, as a means of buoyancy. The discovery of this process was what made possible the development,

through the glider, of the present marvelously effective airplane. An initial though incomplete knowledge of the process was the essential.

A Feeling of Personal Responsibility.—Still another factor is essential—the feeling of personal responsibility for accomplishing the desired end. In the illustrations already given this feeling has been assumed. It usually directly accompanies the feeling of the worthwhileness of the end to be accomplished. If one only feels the worth of an end and feels it keenly enough, he will put forth effort in the attempt to bring it to pass—usually, but not always. The cook may see clearly the desired product and realize the importance of having it made; she may be an expert cook; and yet, if she does not at the same time feel her own responsibility in the matter, she will not go to work to produce the loaf of bread. We all see more or less clearly the desirable end of securing efficient government. We realize keenly that it is worth while; some of us see the principles and the process necessary to secure good government, but we do not have it. The reason for this is that we do not feel sufficiently our own responsibility to take the steps necessary to secure good government. We seek to shift this from ourselves to others. In the World War, the end to be reached was clear and how earnestly it was desired and how eagerly we all looked for it! Why, then, did not everyone do all that he could to bring about this end? Merely because some felt no personal responsibility for achieving it. They grumbled about the taxes, they refused to contribute to the Red Cross, they felt abused because they were inconvenienced by the nation-wide effort to

conserve food; the feeling that they were personally responsible for the successful conclusion was totally absent. It is necessary to emphasize this factor also because the remoteness of the end to be attained often makes its worth-whileness less apparent. Even in cases where the end is clear and not too remote, its effect upon ourselves is often obscure and indirect, for this reason and it is all the more necessary to develop the feeling of responsibility.

It may be objected that, while these factors are necessary in certain skilled operations, they are not essential in more mechanical or unskilled activities such as feeding an automatic machine. While they are, perhaps, more apparent in the complex situations, they are none the less real factors in operations that are largely automatized. Here the *end* in view need not be the finished product but merely "keeping the machine fed up." The purpose or need, the worth-whileness of "keeping it fed up," may not be intrinsic; the purpose may be keeping the job, doing the work assigned; but even so the need is a real one. The worker must know the process and he must have a sense of personal responsibility for doing it. All the factors are thus present even in the operations that are comparatively simple.

It is also important to remember that, while all of these factors are essential, they are not necessarily separate in consciousness nor need they always appear in the order indicated. The feeling of personal responsibility often comes even before the end is perfectly clear, and a knowledge of the process sometimes antedates both.

In considering ends or aims we should be careful to distinguish between ultimate or remote ends and those that are immediate. The latter constitute steps, not stopping places, on the way to the ultimate end. The very process itself by which we reach the goal points out many intermediate points or ends that must be reached if the ultimate goal is to be attained.

The Essential Factors and the Work of the Teacher

If it is important for us to realize that these factors are present in simple activities, it is all the more necessary to emphasize the fact that they are also present in such a complexity of activities as those involved in the work of the teacher; if effective work in a simple situation is conditional upon consciousness of these factors, how much more necessary it is that the teacher should be conscious of them in his work? This realization is also made imperative because education covers such a wide range of human activities that its aims are very complex and often quite remote; moreover, the champions of its various forms are often so insistent and narrow-minded that it is difficult to distinguish the essential elements. It is little wonder that teachers become perplexed and confused, not knowing where they are nor where they are supposed to go. Under the circumstances they are at least partly justified in the attitude of indifference that they sometimes assume toward the ultimate effects of their teaching. "It is enough merely to do the daily task; where this leads is no concern of ours; we are content to leave this to

the principal or to fate." It is only fair to say that this attitude of unthinking obedience to orders or of conformity is too often fostered by the powers higher up who prefer to have their teachers confine their attention to the minutiæ of the daily task; they do not care to have them "distracted" by thoughts of where this is leading. Fortunately this type of administrator and supervisor is fast disappearing. More and more we are coming to see that the most efficient work can be done only when the worker is conscious of the end and works intelligently toward it. This is all the more important when we see that the daily task of each worker in whatever field it may be should be made to contribute, as far as it can do so, to his own personal development. This development can be achieved best only when the three factors already discussed are present in the consciousness of the worker:

1. Purpose—a clear idea of the end to be reached and a reason for reaching it.
2. A knowledge of the principles and processes involved.
3. A sense of personal responsibility for accomplishing the end set up as a goal.

In the succeeding chapters the attempt will be made to describe simply and clearly the ends to be reached in teaching, both ultimate and proximate, and some of the principles and processes involved in reaching these ends. The third factor, a sense of personal responsibility for accomplishing the end, must ultimately be left to the conscience of the individual teacher, although much can be accomplished by superintendents and su-

pervisors in giving to teachers a large share in formulating policies and a wider freedom for individual initiative in carrying out these policies.

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CHAPTER II

THE SCOPE AND PURPOSE OF EDUCATION

Education began before the dawn of civilization. At that time and for long afterwards it was comparatively simple, consisting for the most part of teaching the young how to hunt and fish, how to prepare food, clothing and shelter, in what ways to propitiate the spirits by which they were everywhere surrounded and upon whose good-will their very existence depended.

The Complexity of Education

As civilization developed, human activities became more complex, industry more specialized, and, in consequence, education also became complex and specialized. It is this very complexity that makes it difficult to keep clearly before us its aim or purpose; the many and varied aspects confuse us. It is like a mountain; the closer we are to it, the less we see the mountain itself and the more we are absorbed in the details of its structure. It is only when we are at a distance that we see the mountain itself in all its beauty and grandeur. When very close, we see only the rocks and ridges, the cliffs and gullies. These represent the daily and weekly tasks of the teacher. They are of the utmost importance but they are not

the mountain. At a greater distance we see the separate ridges and small peaks that make up the mountain as a whole. These are represented by the various "kinds" of education, so-called, such as general or cultural, vocational, health, civic, etc. Standing at this intermediate distance, the mountain takes on different characteristics depending upon the point of view of the observer. It is in turn rough and forbidding, beautiful and inviting, easy of ascent and unattainable. These views are interesting and important, but they are not the mountain. So education viewed from these different angles is varied and ever-changing. It is important that we get each of these aspects, but we must remember that no one of them is education. Education, like the mountain, must be seen from a distance to be fully understood. Then and only then do the various facts, like the peaks and ridges, the cliffs and valleys, become merged into one homogeneous whole.

The Large Aspects of Education

Perhaps we may also observe that even at a distance the mountain is not always the same, but assumes different characteristics, depending upon the point of view of the observer. So in education, dealing as it does with certain ends that must be attained in human beings and largely through human beings, themselves complex, the ultimate end or aim has or may have slightly different aspects.

Man may be viewed from various standpoints.

The Biological Aspect.—First, man is a living organ-

ism, an animal, and as such he partakes of the nature of a living organism and is subject to the laws that govern all such living things. In his education, in common with all the other forms of his activities, he may well be considered as a living organism in the midst of an environment made up of inorganic matter and of other living organisms, and acted upon by physical forces and subject to all the laws of nature. This is the biological viewpoint and is of fundamental importance.

The Social Aspect.—Again, man is a social being, surrounded by other human beings like himself and profoundly influenced by them. Education may very profitably be considered from the standpoint of his relationship to other human beings. This is the social or sociological viewpoint.

The Ethical Aspect.—Man is also a being which has a consciousness of right and wrong. When education is considered from the standpoint of the development of this consciousness, we call it the point of view of ethics.

The Religious Aspect.—Similarly we may think of man as a religious being, having a more or less direct and personal relationship with some form of being, spirit, or force higher and more powerful than himself, whom he respects or worships. When we consider education with reference to this aspect of man's life, we call it Religious Education.

These various aspects are not mutually exclusive, but each one supplements the other, and, if we are to understand the ultimate end of education, we must not forget any one of them.

The Biological Point of View

From the standpoint of biology the purpose of education is the adjustment of the individual to his environment. This concept is fundamental, and, interpreted broadly, underlies all other concepts of education. It should be especially helpful to the teacher, for it very definitely shows how the work of the school is related to the forces which govern the development of all organic life as revealed in the history of the earth and as seen in all living forms.

One of the most striking facts revealed in a study of the development of the plant and animal life is the constant change that takes place from the lower and simpler to the higher and more complex forms of life. As indisputably proved by the records left in the various strata that make up the earth's surface, the first forms of organic life to appear on the earth were very simple in structure. They were, in fact, the only forms that could have existed with conditions as they then were. Gradually, as conditions changed, other more complex forms appeared. These new forms were at first comparatively few in number, but, as conditions became more favorable, they developed rapidly and soon became the dominant type of life. Not that the simpler forms did not continue to exist, but they became, relatively at least, less numerous and no longer dominant. The same process is seen in the case of the higher forms of plant and animal life. We see small, insignificant fern-like plants appear at a certain time in the development of the world. As the land becomes somewhat more stable and atmos-

pheric conditions more favorable, they multiply and continually grow larger until we have the giant tree ferns and allied plants of the carboniferous era. Then, too, as conditions again change we see these same plants dwindle in size and become few in number. Here and there in favored localities a few of the giants still remain, but for the most part they are now represented by the lowly ferns of field and forest. In the same way the reptiles first made their appearance as small, insignificant animals, few in number. As conditions change we see the large dinosaurs of the carboniferous era become the dominant type of animal. Gradually these gave place to other forms and they themselves dwindled in size and became fewer in number. This waxing and waning is one of the most striking characteristics of the development of life upon the earth.

What was the cause of this phenomenon? These changes were not haphazard, nor were they due to the mere caprice of an all-powerful being, a Jupiter who ruled over all, who was experimenting, who would create this and destroy that according to the whim of the moment, or in order to tickle the fancy of a Juno or a Venus. They were the result of natural laws—laws that still govern all organic life. The most important of these is that of adjustment. In order to live, any animal must be so adjusted to its environment that the processes of life can be maintained, and, if it is to compete successfully with other animals, these processes must be maintained at their maximum efficiency. In order to live in water, fishes must be so constituted that they can secure their oxygen from

the water and their food from organisms that live in or near the water. On the other hand, dogs, living on land, must have a different organization that will allow them to secure their oxygen from the air and must be so constituted as to enable them to feed upon the animals and plants that live on the land. This is called adjustment to environment. Although we see it as a finished product and, therefore, often think that it always existed, it was, nevertheless, a slow process covering thousands or millions of years. A simple illustration may serve to show the essential elements in the process.

Suppose, at some age long ago, there was a lake inhabited by many different kinds of fish: trout, perch, pickerel, bullheads. For some reason this lake gradually began to dry up. In the spring it would be full of water, but when the hot dry summer came, it gradually dwindled away until little water was left. What would happen to the fish? Most of them would die because, while they were well adapted to live in the lake when it was full of water, they were not equally well adapted to the conditions in the summer when the lake was nearly dry. But the effects of the changed conditions would not be so immediate upon certain kinds of fish, such as the bullheads or catfish, as it would be upon others, such as the trout or perch. The latter would, then, die more quickly, and, if the period of drouth was very short, some, at least, of the bullheads would survive. Consequently, when the pond filled up again, the only fish left would be the bullheads. They survived because they were better adapted to drouth conditions than the trout and

perch—they were "hardier" as we say. If this occurred year after year, those among the bullheads that could best withstand the dry period would survive while their less hardy brethren would perish. Since, each time, those who could best withstand the drouth were selected for survival and since these would breed offspring like themselves, with each recurrence of the drouth those surviving would be able to endure longer and longer periods of drouth until we might find that they were truly amphibious animals, like the mudfish or even the frogs. In other words, they would have become adapted or adjusted to the changed environment. Of course this would not be a conscious process on the part of the fish in question, but would be an unconscious process produced by a change in environment which selected those fish for survival that could best endure the new conditions. One of the most powerful factors in the development of organic life since the world began has been change in environment. Changes in organic life may and do occur even though the environment is relatively stable, but the changes thus produced are by no means so rapid nor so profound as those made when the environment is changing.

The record of the development of the earth in geology reveals many changes in atmospheric conditions, in humidity and in temperature, in the relative amount of land and water, in the stability of the surface, and in many other conditions. Some of these changes came about very slowly; some were sudden and cataclysmic. Whenever they occurred, we find that there were great changes in plant and animal life. Whole genera or

families of animals disappeared entirely, never to reappear. This means that they could not change sufficiently to become adjusted to the new environment. In other cases, animals survived, but in a somewhat changed form. In these cases the changes that appeared were such as to enable the animal to live under the new conditions. In other words, the process of adjustment had taken place. These changes are continually being made even before our eyes, but they are often so gradual as to escape our notice. In this process we see that nature puts a premium upon adaptability. The price that any organism pays for lack of this quality is death and extinction. This is a rigorous law from which there is no escape.

All life is subject to the very same law, the higher forms as well as the lower. There is, however, this essential difference. As we ascend the scale of animal life we find that the power of adjustment continually increases. On the whole, the higher, more complex forms are able to adjust themselves more quickly and effectively to changes in environment. In the lower animals this is unconscious on the part of the animal, but as we ascend we find evidence of real conscious adjustment—a conscious effort on the part of the animal itself to meet the new conditions. This reaches its culmination in human beings where we see conscious adjustment in its highest form. By his inventions and his machines man can adjust himself to live in the frigid regions of the north or south and in the heat of the tropics, he can fly through the air, he can live on the water and under the water, he can prosper in many other conditions where it would be im-

possible for him to live if he depended solely upon his physical equipment. But of even greater significance than this is his power to prepare not only himself but his young *in advance* to meet future conditions. By so doing he makes it possible to live in an environment that is totally different from that to which he, as an animal, was fitted. By a long process of development he has perfected a method by which it is possible to give this preparation so quickly that a child learns in a few years what has taken the race milleniums of time to accomplish. But man does much more than this. He not only can adjust himself to new and, as yet, unrealized situations, but can also change the environment to meet his needs. This power he also shares with many animals. The rabbit makes a nest or form from the grass and thus changes his environment and in this way becomes more comfortable. The bird accomplishes the same thing more elaborately by nest building. The spider spins his web, the crayfish digs his hole. All of these change their environment to meet their needs.

Important as these are and elaborate as the nest of the oriole may be, they are insignificant when compared with the ways in which man is continually changing his environment. In order to travel more rapidly and comfortably, he builds roads; wood, iron and other materials he shapes and assembles in various ways to produce vehicles in which he can go from place to place. Out of the skin of animals, the iron of the mines, and fibres of plants he makes coverings for his feet that enable him to move about over stones and thorns with comfort. He builds elaborate houses,

stores, hotels, ships, and countless other buildings for his comfort and convenience. He bridges river gorges; he tunnels through mountains and under rivers to make distances less and travel more rapid. He takes metal from the earth and stretches it out into thousands upon thousands of miles of small wire that encircles the earth and over this he sends messages with almost inconceivable speed. All of these are but a few examples of the ways by which man changes his environment.

Man, as an animal, then, both adjusts himself, consciously, to his environment and changes his environment to suit his needs. He also consciously prepares his children so that they can adjust themselves to present and future conditions and teaches them how to change their environment so as to be better adapted to them. This process of conscious adjustment we call education. Its purpose is to make possible the most efficient life for each individual.

The Sociological Point of View

In the preceding section we have seen that education is a biological process. From this point of view it is a process of adjustment of the individual to his environment. The purpose of this adjustment is largely the survival of the individual himself, or, if not the actual survival, it has in view superior efficiency of life of the individual. In any case it is largely individual. When we consider education from the standpoint of sociology, we no longer think of the survival or the success of the individual as such, but of the success of the group, of the race, or of society as a whole.

Whenever any group of people come together for work or play or social intercourse, certain conditions are met that are not found in the case of separate individuals. A group is more than a collection of individuals. A class of children has many characteristics as a class not possessed by any individual child that is in the class. This is apparent again and again in mobs, in armies, in the classroom, in crowds of various kinds. There is a mob psychology that differs from the psychology of the individual; there is a spirit of the school or college that makes for success or failure. Whether the group is a tribe, a family, a committee, a class, or the personnel of an industrial establishment, there are certain rules, laws, or customs that all must observe in order to preserve the unity and efficiency of the group. Children in the schoolroom cannot be allowed to romp and shout and throw things at one another. The work of the class could not go on under such conditions. There are certain customs that must be observed by all. It is the same in a shop, in an army, or in a state; certain individual inclinations must be suppressed, certain methods of coöperation adopted and different kinds of work assigned to each or assumed by each if efficiency is to be secured. This characteristic is also seen clearly in all gregarious animals. Flocks of birds, herds of cattle, droves of wild pigs, packs of dogs and wolves, colonies of bees and ants—all are social organizations and are made possible only by the observance of certain well-defined customs or social habits. Those who do not observe these are killed or driven out of the social unit. The climax is reached, however, with human beings, and the

social customs and the consequent inhibitions on individual freedom of action become matters of conscious development. As society has progressed, it has been discovered that much greater efficiency can be secured and the comfort and welfare of all can best be conserved by a continually increasing degree of specialization of work. This has resulted in an extremely fine division of labor. Modern society needs not only the butcher, the baker, and the candlestick-maker, but also skilled workers in the thousands of other occupations listed in the census. But this is not all. Modern industry is highly specialized; occupations are no longer simple, but have become very complex, often involving many different kinds of processes in the same occupation, each demanding its own peculiar skill. If the wheels of modern industry are to turn smoothly, individuals must receive the specialized training that will develop these different types of skill necessary. Society also needs intelligent citizens in all the various activities essential to citizenship. This specialization of work, this multiplication of duties and obligations, necessitates definite preparation, adequate training. Human beings are not fitted by nature to undertake these important duties, to perform these skilled operations; they must receive definite and often prolonged preparation before they can undertake them safely. This preparation is education. From the standpoint of sociology, then, the purpose of education is to train the individual or to prepare him to take his proper place in human society, to assume the duties and obligations of self-supporting citizenship in order that society may attain its highest degree of efficiency.

The Ethical Point of View

In the discussion from the two preceding points of view, human beings are seen to exhibit the same general characteristics as those observed in animals. The chief differences are in the complexity of the situations and in the greater consciousness of effort exhibited by human beings. There is another characteristic in which man stands preëminent—the consciousness of right and wrong. Man is an ethical being; he is conscious that certain acts are right and others are wrong. It is no part of our purpose here to discuss the origin of the development of this consciousness. For our purpose it is enough to say that it exists. It is affirmed by many that there is always an impulse within us to do the things that are right and to keep from doing the things that are wrong. Whether this is invariably so or not we will leave to philosophers to decide, but even granted that the impulse is there, we all know from our own experience that this does not necessarily mean that we actually do the act which we know is right or refrain from doing that which we know is wrong. This is summed up in the old saying that "knowledge and virtue are not synonymous." Acting right and inhibiting wrong actions are as truly habits acquired by long experience as are writing and reading.

There is another point that is of great importance for us to keep in mind in this discussion. This is the distinction between the subjective right and the objective right. Right action subjectively, or from the point of view of my own personal responsibility, is

an action that to me seems to be right. On the other hand, right action, objectively, can be judged only from the standpoint of its effect upon others. Thus the same action may be subjectively right and objectively wrong. This is often the case. A common example of this is charity. A man stops me on the street; he tells a story of hard luck and deprivation and asks me for money. Moved by his story, my impulse is to reach into my pocket and give what he asks. In so doing I will relieve suffering and help one in need. Suppose I follow the impulse and give; am I doing right? I believe I am doing good. Subjectively it is a right action. Is it so objectively? This can be answered only by finding what the result has been upon the beggar and upon society at large. The human race has accumulated abundant evidence that such giving is not helpful but actually harmful in ninety-nine cases out of a hundred to the individual beggar and to society as well. If, then, the subjective right and the objective right are not always the same, what are we to do? The answer is plainly written in the history of civilization—it is our duty to learn as much as possible about the probable effect upon others, as well as upon ourselves of a proposed line of action and let this determine or influence our judgment of what is right. We cannot always depend upon our feeling of what is right and what is wrong; we must be guided by knowledge of the effects of such action in the past. Common experience and scientific investigation are continually revealing to us that the effects of certain activities are harmful, so that what was once thought to be right is now considered to be wrong. Instances

of this are lotteries, monopolies, certain acts in war, and even war itself. If this is true, the knowledge of what is right and what is wrong is not static—it constantly advances—it changes from age to age. It must, therefore, be learned. We see three elements in this ethical aspect that are of special interest here:

1. The impulse to do what we believe is right must be made to result in right action; these actions form habits and are the results of training.

2. Knowledge of what is right is essential to right action.

3. This knowledge is constantly changing, due to more complete information regarding the results of acts.

All of these elements are parts of education. The purpose of education from the standpoint of ethics is the development of a knowledge of what is right and what is wrong and the development of habits of acting right and of inhibiting wrong action.

The Religious Point of View

The last general aspect of education that we shall consider is that of the religious side of man. We have already seen (page 15) that religion, in essence, is the feeling of personal relationship to some being, force, or power conceived as being above or beyond the individual. Simple as this is in statement, the particular ways in which this force or being has been conceived and the kinds of personal relationships developed are so varied as almost to baffle description. It would be difficult, indeed, even to list the many kinds

and varieties of religions and sects now existing. Some of them are as different as day is from night, while others are so nearly alike that it is often impossible even for the members of the different sects to distinguish the elements that separate them. Some are extremely simple, while others are so complex that they can be understood only by the carefully trained priests or devotee. Practically all, especially those more complex, have embodied in them centuries of tradition. Some of this tradition is purely mythical, some historical or semi-historical, and all vastly important from the standpoint of the adherents of the particular form of religion in question. Among savages these traditions take the form of totems, of evil spirits, that must be kept away or propitiated and of good spirits that must be invoked. It is important for us to remember that these traditions and beliefs were, to the savage, not theoretical, philosophical, or impractical, but very real, often involving matters of life and death. They were inseparably interwoven into his daily life and duties. To know them and to act in accordance with them was one of his most important obligations. Each young man had to be carefully instructed in these traditions and trained to observe them before he became a full member of the tribe. At the time of the initiatory ceremonies, these beliefs and customs were indelibly impressed upon the young novitiate by fasting, torture and mystic rites. These ceremonies also made the spirit world very real and intensified the idea of the personal relationship of each to this spirit world. This constituted the religious education of primitive man. It also constituted by far

the largest part of his total education; for shooting, hunting, fishing, preparing food and clothing were learned largely by direct imitation. In this religious education the medicine-man was the principal teacher. He alone knew the complete secrets of the tribe; to him was entrusted the preservation of the sacred customs and beliefs; upon him rested the tribal responsibility of initiating its new members. This description has been given somewhat in detail so that we may see, in a simple form, what is the general purpose and aim of religious education, for this purpose is not essentially different, even in the more highly developed religions of civilized peoples.

Let us substitute for the good and evil spirits of the savage the Jewish and Christian Jehovah and for the traditions and customs of primitive man, the story of Jehovah's dealings with His people and the many and varied religious rites, customs, and church organizations of different sects, and we may be able to understand religious education as it is to day. As seen in the case of primitive man, religious education in twentieth century America consists in teaching to young people our beliefs regarding the Supreme Being, His place in our world and in the Universe, His attributes, and our own personal relationship to Him. To aid in this process we teach the story of the relationship of this Supreme Being to certain portions of the human race and relate the experiences of men and women who were distinguished either because of peculiar relationships to this Supreme Being or who showed in their lives, preëminently, the attributes and qualities that were characteristic of Him, or were supposed to be

approved by Him. In addition to this, each sect has its own peculiar beliefs or theology, its own method of worship calculated to impress the beliefs more firmly and to develop, foster, and deepen the feeling of personal relationship to the deity. Each has its own church or organization and its own varying religious activities. All of these are largely matters of instruction. Individuals must learn the beliefs, they must be taught how to participate in the various religious activities, they must be carefully instructed in matters of church history and customs. Even from this brief description it may readily be seen that the religion of primitive man contains the same elements as that of civilized man. Such differences as occur have to do chiefly with variations in particular beliefs, in the way in which these beliefs affect the daily life and activities of those concerned, and in the variety of habits and customs in religious observances.

The purpose or aim of education from the standpoint of religion is:

1. The development of a belief in a Supreme Being, the form of the belief differing with each type of religious group, and the intensification of this belief by a knowledge of the religious history of the group and an appreciation of the lives of noble men and women who have exemplified the religious ideals.

2. The formation of the habits, customs and methods of worship characteristic of a religion or a sect.

3. The development, deepening, and maintenance of the feeling of personal relationship to this Supreme Being.

This aspect of education is of very great importance;

nevertheless it cannot have a large place in the discussion of public education in America because it is not possible, under our present laws, to provide a place for it in our public schools. In order to get a clear idea of the reasons why it is impossible, or at least very difficult, to provide religious instruction in our public schools, it may be well to refer again to primitive man. Each tribe of savages has its own beliefs, traditions and customs; even in related tribes there are often radical differences in beliefs. It is easily possible to provide religious education within each tribe, but suppose a dozen different tribes formed a confederation or union of such a nature that the tribal organization as such was eliminated, that people from different tribes lived in the same neighborhood and went to the same school. It would be a practical impossibility to have each child receive religious instruction in the school, for this would involve teaching each the beliefs peculiar to the tribe to which he belonged. There would be very few elements common to all tribes. Substitute for the tribe a religion or a sect and the practical difficulty is clear. As now organized, it seems impossible to do much in the way of distinctively religious education in the schools. It is often more difficult for sects of the same religion, where many of the beliefs and customs are similar, to get together on such a program than it is for those with radically different religious ideas. It is unfortunately true that too often the violence of disputes is directly proportioned to the similarity of beliefs. In such cases disputes are on points of small differences and matters of minor importance.

Thus it seems clear that we cannot, in this country, give a definite place in our public schools to religious education as now interpreted by our own churches. But we must not conclude that, therefore, it is of minor importance. It means, simply, that this part of education must be provided in some other way than through the machinery of our schools. There is unmistakable evidence that the church is awakening to the need for organized effort in this direction. Sunday Schools are being reorganized, Week Day Bible Schools established, and vacation schools developed for this very purpose. Even now public schools in several states give definite school credit for Bible study undertaken in such schools. Many states provide by law for the release of children from public school attendance for certain hours during each week in order to attend schools established by churches where religious instruction is given. Some states and cities have even gone so far as to organize courses of study in religious instruction and provide for approved standards for teachers.

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CHAPTER III

THE MEANING OF EDUCATION

The last two chapters have dealt with the purpose or end of education. As we have already said, it is of very great importance for a teacher to know what this ultimate end is. It is the guiding star that enables him to steer a straight course. It gives perspective and provides inspiration, but it tells him very little about the path by which we may attain this end: it tells him what education is for, but it throws very little light upon the question of what education itself is or of how it is to be obtained.

Education Defined

What, then, is education? In Chapter II we have seen that the purpose of education from the standpoint of biology is the adjustment of the individual to his environment. This presupposes that the individual is not adjusted, that he needs adjustment. In other words, he must be made over, changed, modified. From the standpoint of sociology the purpose of education is to adjust the individual to his social environment; to develop certain habits and attitudes that will enable him to live with his fellows. This also means changing the individual in many ways. In Chapter

II we have seen that from the standpoint of ethics the purpose of education is adjustment of the individual to the ethical side of his environment or, specifically, the development of a knowledge of what is right and of habits of right acting. Here again we see the fundamental principle is changing the individual. He must be made over. The same is true when we look at the purpose of education from the point of view of religion. Religious education is the adjustment of the individual to that part of his environment which has to do with the Deity; it necessitates the inculcation of certain facts or beliefs, the development of certain habits and attitudes; that is, changes must be made in individuals. The making of these changes is education. We have also seen that if individuals were left to themselves without guidance many changes would be made, habits and attitudes formed, that would be undesirable. Hence it is important that these changes be prevented: that definite steps be taken to prevent the formation of undesirable habits. Education may be defined as the process of making and preventing changes in human beings.[1] The purpose of these changes varies somewhat with the particular point of view from which we look at man and his activities, whether from the standpoint of a living organism, a social animal, a being who has a consciousness of right and wrong, or a being who is conscious of a higher power and who enters into personal relationship with him. Viewed in perspective the situation is as follows: certain ends or aims have, in the process of time, been established for human beings; to function

[1] Thorndike, E. L., *Education*, pp. 1–8.

properly they must attain these aims; education is the method or process of changing or modifying human beings so that they can attain these aims.

General Kinds of Changes

Many different changes take place in every human being during the period of his natural life, from birth to death. Some of these changes are in the bony skeleton, some in the muscular system, some in the circulatory system, and some in the nervous system. A few of these are well illustrated by the physical changes in the period of early adolescence described in the following quotation: "The increase in height of the normal child in its first year of life may be as much as fifty or seventy-five percent over what it was at birth. But the rate declines sharply year by year until the ninth for girls and the eleventh for boys. At this time of the lowest ebb in growth the annual increase may be less than three percent. Then there is a somewhat abrupt upward turning in the curve, especially of boys, which in two or three years reaches a maximum of four or five or even six percent of gain over the year previous. . . . The acceleration in stature referred to above is only one of many accelerations of this period. Puberty is, in fact, accompanied by rapid increases in almost every other aspect of bodily development. The heart maintains about the same ratio to the rest of the body that has existed in childhood. The arterial system grows 'less, relatively, than the heart,' so that at adolescence the blood pressure is greatly increased. The muscles develop faster than

any other part of the body, resulting in a marked increase in weight. While rapid increase in weight begins at the time of the more rapid growth in stature, it is not at first so manifest. The curve, however, rises higher and stays up longer. Puberty with girls is generally accompanied by an increased girth of chest and hips, and before the teens have passed, both boys and girls, if in ordinary health, attain a well rounded muscular development that gives them very nearly their normal weight as adults. At the same time, also, occurs an increase of lung capacity, more striking in the case of boys than of girls but clearly evident in both sexes. Muscular strength as measured by the grip of the hand, the lifting power of the arms or of the back also increases rapidly at the same time." [2] Most of these changes are due primarily to nature, and are only slightly affected directly by external conditions. Yet even here, conditions of food, sanitation and social surroundings may materially modify the physical changes. Other changes, such as development of manual skill, acquisition of facts, and formation of habits of thought, are largely dependent upon and conditioned by environment. It would be well within the truth to say that there is no change in man's physical nature that is not affected to a greater or less extent by outside influences. Scientific principles applied to nutrition, to exercise, to clothing, to ventilation, to medicine, to corrective gymnastics, all make changes in the physical nature which have profound significance for the individual and the race. Wherever human beings at-

[2] King, Irving, *The High School Age*, pp. 13, 14, 16–19. Used by special permission of the publishers, Bobbs-Merrill Co., copyright, 1914.

tempt to bring about changes in any part of man's nature, we call the process "education"; hence these physical changes, when made for a specific purpose, may properly be included under the same term.

While education may profoundly affect the entire body, both directly and indirectly, it is concerned primarily with the changes that take place in the nervous system, for this is the mechanism by which thoughts and acts are controlled. However, we cannot say that all of these changes are due directly to education. Certain changes are due primarily to inborn nature, to natural growth; that is, they would take place in the natural growth of the body without conscious outside influences. Education is chiefly concerned with changes that are consciously made in the *nervous system and for a specific purpose.* This purpose need not be conscious in the mind of the person in whom the changes are made, but it usually is conscious in the mind of the teacher.

Without going deeply into the psychology of such changes, we may say, in general, that they consist of connections that are definitely made between neurones or systems of neurones by means of which nerve impulses are directed into certain channels.

A neurone or nerve cell is the fine subdivision of a nerve. "For instance, the optic nerve is essentially a bundle of very fine thread-like bodies of protoplasm placed side by side like the wires running from pole to pole along a telegraph line. Each of these neurones or nerve cells of the optic nerve has one end in the retina of the eye and the other in the brain (in the parts called the geniculate bodies). Again, if we

could see exactly the structure of the brain itself, we should find it to consist of millions of similar neurones each resembling a bit of string frayed out at both ends and here and there along its course. So also the nerves going out to the muscles are simply bundles of such neurones, each of which by itself is a thread-like connection between the cells of the spinal cord or brain and some muscle. The nervous system is simply the sum total of all these neurones, which form an almost infinitely complex system of connections between the sense organs and the muscles."[3]

Rough drawings of several types of neurones are here given, showing the general structure. Each neurone consists of three or four parts: a cell body (numbered 2 in the diagram), a dendrite (1), an axone or neuraxone (3), and a terminal arborization (4). Each axone usually has one or more branches called collaterals (5). The relative proportions are not at all the same as those indicated in the diagrams. The thickness of the thread is greatly exaggerated and the axone is usually very much longer in proportion to the rest of the neurone than is indicated. As a matter of fact, there is an almost infinite variety of neurones. They range in length from less than a twentieth of an inch to more than three feet. Some are simple threads with few branches; others are very complicated. These neurones are not separate and distinct, but some part of one is always in close proximity to some other neurone or even to many others. This connection is called a synapsis or synapse, and is usually between the

[3] Thorndike, E. L., Elements of Psychology, pp. 125, 126. Used with permission of the publisher, A. G. Seiler.

terminal arborization of one neurone and the dendritic process or the cell body of another. No. e shows, in general, the method of connection or "synapsis" be-

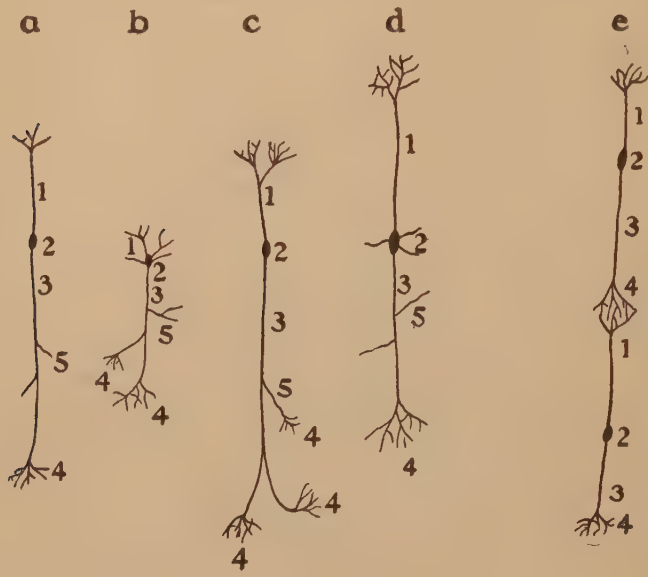

DIAGRAM I

TYPES OF NEURONES

1. Dendrite or dendritic process
2. Cell body
3. Axone or neuraxone
4. Terminal arborization
5. Collateral

tween neurones. The dendritic process, 1, of one neurone is intertwined with the terminal aborization, 4, of another neurone. It is this connection that makes possible the passage of a nerve impulse from one neurone to another. When I place my finger on a hot stove, the nerve impulse passes from the sensory

neurones in my finger through a series of synapses to the central nervous system and is immediately directed into the motor neurones which control the muscles of the finger, hand and arm, and the finger is taken away. When an object, as a ball, is coming rapidly toward me, the nerve impulse resulting from the sight of it passes along the optic nerve and is directed into the motor neurones which control the muscles of the eyelids, or the head or possibly the body, and I either close my eyes, move my head, ward it off, or dodge out of the way. These connections are largely instinctive, automatic, and are not usually considered to be the result of education, although, in each case, experience may materially modify the physical action.

In the case of the complex habit we call writing, the changes in the nervous system are entirely due to education. In this habit, as described on page 47, the nerve impulses that come from the sight of the letter in the process of formation and from the sensations that are the result of the contraction of the muscles of the hand and arm are together directed into the neurones that control the muscles used in holding the pen and in directing the movements necessary to form the letters. In this case the connections are not instinctive but are the result of conscious effort, of education. This direction of the nerve impulses is not haphazard; it is always, in the last analysis, for the purpose of producing those responses which will be useful either in adjusting the individual to his environment, in changing his environment to meet his own needs or the needs of society, and in developing and controlling his own powers. All of these are seen in

the cases cited. Some of these connections may be very simple and very specific, consisting of connections between closely related neurones as in the case of the finger touching the hot stove. Others are very general, consisting of connections between larger, more complex and widely separated groups of neurones. In general terms, these connections are described as habits of thought and of action, as feelings, as attitudes, as ideals.

All of these are merely happenings in the nervous system. Such a comparatively simple habit of thought as thinking "6" when the combination of ideas "3 times 2" is presented to us is nothing but a connection between sets of neurones in the brain by reason of which the nerve impulse which results in bringing to our consciousness the combination "3 times 2" goes on automatically and brings up the idea "6." Roughly speaking, all education is the process of making such connections between neurones in endless variety. Certain sensory neurones are by a conscious process—education—so connected with certain associative or motor neurones or systems of such neurones that when the sensory neurones are stimulated the nervous impulse is automatically directed into the connected system. The feeling, the idea, the attitude, the action desired is the result. When such connections are consciously made for a specific purpose, we call the process education. Upon the number and kind of connections in the nervous system depends the amount and quality of the education of each person.

It is not definitely known just how these connections are made. It is evidently due to the modification and

growth of certain parts of the neurones. This may very crudely be described as follows: Suppose, for some reason, we wish to keep our finger on the hot stove instead of taking it away; evidently the nerve impulse will need to be directed in such a way that the muscles of the arm will hold the finger on the stove. This is quite different from the instinctive reaction.

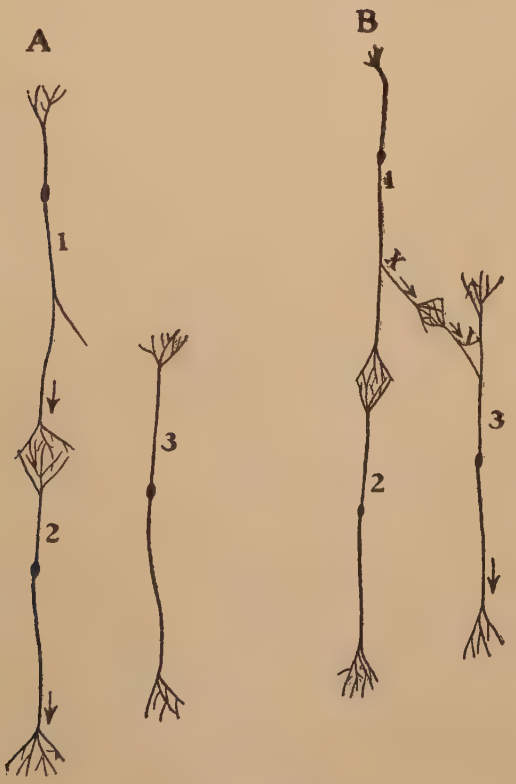

DIAGRAM II
FORMATION OF CONNECTIONS

No connections between neurones have been formed that will provide for this. We must, then, make new connections, Diagram II.

The old connection is shown in A. Here are three neurones,—1, 2 and 3. 1 and 2 are connected in the usual manner, while 3 is close by but not connected. 1 conveys the nerve impulse coming from the feeling of heat or pain through 2 to the muscles, which contract in such a way that the finger is taken away. B represents the new connection. One of the collaterals of neurone 1, (x), and a part of the dendrite of neurone 2, (y), have grown out and formed a new connection, so that neurone 1 is now connected with neurone 3 and the nerve impulse, instead of passing to neurone 2 as before, passes through 3 to another set of muscles that hold the finger on the stove.

Preventing Changes.—But there is another step in the process of education that is equally important. We have seen in Chapter II that the adjustment of the individual to his environment often necessitated making the individual over. That is, if left to himself he would not form the habits nor develop the attitudes that would best secure his adjustment and, at the same time, be a help to society. His tendency would be to react in ways suited to a mere physical environment or, at least, to a more primitive type of life. This he must be prevented from doing. His parents or the tribe as a whole must see to it that he does not do certain things that would injure himself, such as eat poisonous roots or expose himself to attacks from wild beasts. This is also a part of his education—to prevent him from doing certain things, from forming cer-

tain habits. This is just as true in modern society as in primitive times. Much of our effort must be devoted to preventing children from forming those habits that they would by nature be likely to form. If such habits are once formed, steps must be taken to break them. This is always a difficult process, far more difficult than to prevent the formation of the bad habits in the first place. Hence education must be concerned with making changes and also with preventing changes in human beings.

The application of this to the process of education may be made more clear and definite by a few simple illustrations from geography and handwriting. No attempt is here made to analyze completely the neural processes involved, but merely to indicate in a general way what the changes are which we wish to produce.

Geography.—Geography is the study of the earth as the home of man, or the study of the physical background of man. This study involves many complex psychological processes, but we shall consider only a few of the simpler and more general ones. The student of geography must in the process of learning form certain concepts, make certain associations. A good example would be the term "river." In forming this concept the learner associates with the spoken or written word all the principal characteristics of rivers, such as "large stream of water," "valley," "erosion and deposition," "source," "mouth," "uses to man," and other associations equally desirable. In other words, he must make such connection between neurones that when the nerve impulse comes to the brain through the auditory or the optic nerve resulting from the sound

or the sight of the word "river," it will automatically go into those groups of neurones the stimulation of which results in the ideas "valley," "mouth," "source," etc.

In the same way associations are made with names of cities, of counties, of islands, etc.; for example, the word "Denver" is connected with the ideas "city," "Colorado" and with certain facts of climate and of altitude, possibly of politics, of Judge Lindsey and with many other ideas, all representing, as before, neural connections by means of which the nerve impulse is directed into certain brain areas.

One function of geography is to develop certain attitudes, such as sympathy and toleration, towards people in other lands. This, again, is merely the formation of neural connections by means of which the sound of the word "China" or "Chinese" will automatically produce certain emotional reactions; that is, the nerve impulse will automatically stimulate certain groups of neurones which will result in the desired emotion or attitude. It will thus be clearly seen that these are changes that are made in the nervous system and are made consciously for a specific purpose. During this process effort is also continually being made to prevent the formation of undesirable connections. In the case of the connections with "river" we try to prevent associations merely with one river. Children in a certain school in New York City were studying tidal rivers and had taken the Amazon as a type. One day they were taken for an observation walk on Riverside Drive. Their teacher pointed to the Hudson, showed them how the tide was running and asked them what

river it was. They all said "The Amazon." Sufficient care had not been taken to prevent the formation of this undesirable association, "tidal river" "Amazon."

Again, we must be careful to prevent the formation of undesirable attitudes toward the inhabitants of other nations. We too often associate with "Chinese" "rice eaters," "undersized," "ways that are dark and tricks that are vain," when as a matter of fact many Chinese never eat rice, some are giants and many are as frank and open as can be desired of anyone. All these attitudes should be prevented.

Handwriting.—Handwriting is one of the methods devised for the expression and the communication of thought. It is probably one of the most difficult subjects in the curriculum for the elementary school pupil to master. For a description of the changes involved we cannot do better than to quote from the statement of Professor Frank W. Freeman in his article on Handwriting in the *Encyclopedia of Education.*[4]

"The various movements involved in learning to write are produced by the action of a large number of muscles and nerve centers. The large number of movements necessary for writing partly explains its difficulty. A further explanation is to be found in the fact that these individual movements must be combined in a way which is not instinctive. The instinctive movement of the hand is grasping and in this act the fingers all move alike. In writing, on the other hand, the third and fourth fingers remain in a fixed position

[4] Used by special permission of the publisher, the Macmillan Co. A more complete discussion of the psychology of handwriting may be found in *The Psychology of Common School Subjects* by the same author.

and support the hand, while the first and second fingers carry on the writing movement. Again the thumb does not naturally work together smoothly with the fingers. The fingers are operated by one muscle and nerve group and the thumb by another. When one learns to write, part of the finger group is separated from the rest and is joined to the thumb group. Not only is the simultaneous combination of movements one which is not instinctive, but the order in which they follow one another is not part of an individual's natural equipment. The sequence of movements must be learned as well as the combination. If any movement is made out of time, it causes an irregularity in the total movement and hence in the stroke of the letter. The same principle holds true of the relative strength of the various component movements. If the thumb, for example, is contracted too vigorously on a downward stroke, the stroke deviates to the right.

"From these facts something of the complexity of the writing movement may be seen. The means through which the separate muscles can be made to work in harmony in a complex movement is found in the nervous system. The development of the writing movement, then, means the formation of a system of connections in the nervous system. The various individual movements must be bound together into harmonious action. This is done by the formation of a motor writing center in the brain—a center which especially governs the writing movement."

From these illustrations we can see what the process of education is—that of making and preventing changes in individuals.

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CHAPTER IV

THE TWO-FOLD ASPECT OF EDUCATION

In the last three chapters we have considered in sufficient detail the ultimate purpose of education and its general meaning. It may be well at this point to consider what the function of education is in society, what it is supposed to accomplish.

The Two-Fold Aim of Education

Throughout this discussion it is apparent that there are two main factors involved—society and the individual. Education is the process of making and preventing changes in human beings. These changes are made in *individuals*. The purpose of making these changes is to adjust the *individual* to certain phases of his environment and to give the individual the power to change the environment in such a way as to meet his needs. This seems to emphasize the side of the individual. But what are the elements in his environment to which he must be adjusted and what are his needs? He is, to be sure, in the midst of an environment of physical objects and physical forces. These are of great importance but the dominant factor in his environment is the presence of other human beings and of a more or less definite organization of human be-

ings, or society. He must be adjusted to this factor. His needs also are largely dominated by the social aspect. Whether he wishes it or not, he is a social being, and his development, his very life depends upon the social side of his environment. He cannot escape. Thus we have the two elements always present, the individual and socity. Education must adjust the *individual* to *society,* and at the same time develop the individual himself. So stated the adjustment still seems to be primarily for the sake of the individual; but when we consider that society is made up of individuals we see that the good of society itself is a very definite goal to be kept in view. What this good is we shall discuss in the next section. The function of education is, then, twofold: it must secure the development of the individual, and it must work for the good of society. These two aims are not mutually exclusive, nor are they antagonistic; they are complementary; nor are the means by which the former is attained necessarily different from that employed for the latter. In large measure the same material and the same methods that are relied upon to secure the good of society will secure the development of the individual as well. It is the task of the future to make them completely harmonious. While these two aims should not be thought of as distinct, yet it is helpful to examine each in detail.

The Social Aim

The good of society must always be considered as primary and as largely determining what the changes in individuals are to be. It is necessary, therefore, to

consider carefully what the social needs and demands are, how they arose, and why it is necessary for us as individuals to meet these needs and demands.

Origin of Social Demands.—These social needs and demands arose because of the fact that man is and always has been a gregarious animal; from the beginning of his existence as man, and probably for ages upon ages before that time, he lived not alone but in social groups. A social group, whether it be a flock, a herd, a swarm or any other group, is always stronger than any individual member. It is stronger in resisting enemies; for it can often successfully combat enemies that individual for individual are far stronger; a single member separated from the social group becomes an easy prey, while within the group he is safe. This is seen again and again in the case of sheep or cattle or deer when attacked by wolves. Again, the group is much more efficient in gathering food; it can remove obstacles more easily, it can divide its force, detailing some for hunting, some for fishing, some for gathering nuts and roots, and some for guarding the food gathered together. It also has far greater possibilities for growth, for progress, for it can utilize the experiences and ideas of each individual in the group and can by interchange of ideas adopt plans that are more efficient than the ones formerly used. Therefore, the thing of first importance for such animals is the group organization: this must be preserved at all costs. "United we stand, divided we fall." If this social group is to be preserved intact, individuals cannot be allowed to do as they please regardless of the effect of

such action upon the group. The individual must, to a greater or less extent, be subordinated. He must be willing and able to do his part for the well-being of the whole even if this limits his own freedom. In lower animal groups this is not always much in evidence, but, as we ascend in the scale of intelligence, we find it becoming more and more prominent, until among primitive human beings it is almost a dominant characteristic. The existence of the clan or the tribe depended upon the food supply. In order to procure food it was necessary for the men to know how and where to get it. Hence it became a tribal, *i. e.*, a social necessity for the men to know how to shoot and to trap, to know where the game was and how to secure it. It was also just as necessary for the women to know how to prepare the food properly, for unless it was properly prepared the whole tribe might become sick and its efficiency be decreased. As division of labor increased, each member became more and more dependdent upon others; hence it became more and more necessary for the good of the whole that each one do his own part well. Again, the tribe often learned through accident or experiment some important method of curing wounds or sicknesses, or something else which was of especial advantage to it. For the good of the tribe and of each one in the tribe, this secret must be preserved and handed down to the younger generation. Out of this grew up the social need and demand that the young learn certain things which were considered essential for the preservation of the tribe. This, in essence, is the origin of the so-

cial demand. It is today tremendously more varied, more complicated, than in primitive time, but it has not changed in essential characteristics.

The Cause of Human Progress.—When we look back over the upward path of the race we cannot fail to be impressed with the fact that the rate of progress at the dawn of history was exceedingly slow. For centuries, probably for milleniums, man made very little advance over the state of the higher animals; he was very nearly on the same plane. Gradually he drew away from the animals; then his progress became ever faster until during the past few centuries he has progressed by leaps and bounds and the gap between the plane of the animal and man has become immeasurable; and still the rate of progress increases. As we have said, there was at first little difference between the human and the animal, but this difference was infinite in its possibilities. The real difference was this: human beings had a far greater ability to profit by their own experience and the experience of others than any of the higher animals. When primitive man or a higher animal found himself in a new situation, each would react in the way in which he would have reacted to a situation which was something like it. The animal would react in the same way many times before he learned a new method of reaction; man would learn the new method much more quickly, and, if he saw some one else in the process of learning the useful reaction, he was able to profit by this experience and largely, often entirely, eliminate the necessity for learning through his own experience. This latter ability animals have to only a slight degree. In other

words, when human beings found that a particular method of doing things did not work or found one that would work better, they could change more quickly and completely than animals could, and, what was of still more importance, when others discovered anything that was of advantage, such as tools, primitive man could and did appropriate them to his own use. In this way he could adjust himself to his environment much more quickly and completely and could even change the environment to meet his own needs.

The method by which the ideas of others could be appropriated by society in general was extremely slow in its development. To us, in an age when invention and discovery is the order of the day and when, for the most part, inventors and discoverers are so highly honored, it seems incredible that there should ever have been a time when such men would have been persecuted and even killed, when new ideas would have been suppressed. But it is helpful for us to know that, desirable as our present condition is, it is of comparatively recent origin—recent when compared with the life of the race. In Chapter II, under the heading "Sociological Point of View," we saw how necessary it was, in primitive times, for each member of the tribe to conform to certain tribal customs and rules, to limit his own liberty of action for the good of the tribe. That is, the welfare of his society demanded the suppression of his own tendency to do things in ways different from others. This produced uniformity and in certain cases developed extreme skill in certain operations. It did not, however, permit of much progress. The classic example of such a society is that of old

China, where the suppression of the individual became a national characteristic, sanctioned or even commanded by the national religion. The motto was, "Walk in the trodden paths." This produced a stable government—one that endured centuries longer than that of any other people and, in this respect, has been the wonder of all time. On the other hand, very little progress was made in art, in science or in inventions. However, individual variation can never be entirely suppressed, and was not suppressed even by the Chinese. It was kept from manifesting itself in ways that would influence the form of government or would change methods of tilling the soil or of doing various other kinds of work. Thus inventions were either prevented or their use for the public good was forbidden. But that their force could not be entirely suppressed is shown in a variety of ways. The great number of dialects among the Chinese is considered by many to be one of the ways in which it showed itself. Another evidence that it was not entirely suppressed but only prevented from manifesting itself in certain social lines, is that now, when China has so largely thrown off its bondage to the past, development and assimilation of the inventions of the modern world has gone on so rapidly. The Chinese failed to find a satisfactory solution for the problem of what to do with individual variation.

When society stopped considering individuality as a hostile force, to be suppressed, and began to consider it as so much energy to be used for the benefit of society, a new era dawned. This was ushered in by the Athenians; this was their greatest contribution.

They were the first modern people, for they early discovered the secret of progress, which is the utilization of the individual for the good of the whole. The difference in method between the Chinese of the olden régime and the Athenians can be illustrated in this way. When a Chinese community or the Chinese government was confronted by a new situation and did not know what to do, they said, "How did our fathers do this?" When this was discovered by reference to the sacred books, the matter was settled. When confronted by a similar situation, the Athenians called the men into conference and said, "Let us take counsel together and see what is best to be done. Does anyone have a method to suggest?" The methods proposed were discussed, and the one that seemed best was adopted. This is well illustrated by the incident of the wooden horse in the Trojan War. The Greeks were rapidly becoming discouraged and were on the point of withdrawing, when "the crafty Ulysses" devised the scheme of the wooden horse to meet the situation. It was discussed by the Greeks in council assembled and finally adopted as the best plan. That is, the social group, the tribe or clan, deliberately encouraged the individual to think up schemes, to invent, to discover, and then used the best of these for the common good. It directed individual variation into channels which would make progress of the tribe possible. This is fundamentally the modern point of view and is absolutely essential to all social progress. This precious heritage, the method by which individual variation can be utilized for the progress of the race, is the direct cause of our rapid development in modern

times, for it has enabled man to control the forces of nature. Every change, every discovery, every invention, paved the way for other discoveries and other inventions. Thus man has been enabled to progress more and more rapidly and has still further increased the gap between himself and the animals.

Present Social Demands.—Present social demands are, in essence, exactly what they have always been: first, that each individual shall learn to adjust himself to the social group, shall be able to take his proper place in the social group; and second, that he shall, as far as he can, contribute to the group, improve the social status, devise methods of progress. Division of labor, written language, and countless other discoveries and inventions have tremendously increased and complicated the social needs and demands, until today we find it necessary to set apart an institution, the school, for the purpose of providing a place where some of these social demands may be met, to provide specialists whose chief purpose it is to see that the demands are met, and finally to make it certain that those who have not yet become sufficiently adjusted shall become so by attendance at the school.

The Individual Aim

But human society is not something that exists by itself apart from the individuals that compose it; the welfare of society has no worth as an end except as it contributes to the welfare of the individuals in it. When we speak of the welfare of human society, we merely mean the welfare of all the individuals of

which this society is composed. Or we may be thinking of the majority of these individuals, "the greatest good to the greatest number." From whatever angle we may consider it, we come back inevitably to the individual and his welfare as the end and aim of all. It is, therefore, important that we include as an aim of education the development of the powers and capacities of the individual.

Superficially, it might seem that human society, with its endless restrictions and its annoying regulations, is not a favorable place for the development of the individual, that the only way by which we can hope to attain the highest development as individuals is to get entirely away from society and grow untrammelled by others. Thus argued Rousseau and many others before and since his time; for them the "state of nature" is the ideal state, where no individual is dependent upon others and where each can think as he pleases and act as he pleases. Happiness, they say, consists in not wanting anything that we cannot get for ourselves by our own effort.

Thinkers the world over have long seen that this is a very superficial view and that the real facts are exactly opposite. One of the fundamental discoveries of human society is that each individual secures the freedom to do the things he wants to do, to do the things he can do best, through and by means of dependence upon others. If each individual were compelled to make his own clothes, his own shoes, to procure and prepare his own food, he would have no time for other things. In the process of time a plan has been evolved by which each one does one thing or a

group of related things; by training and constant practice he becomes skilled in doing this one thing, and in consequence he can do it better and more quickly than others who have not had this training and practice. He, therefore, makes this one product, and, in return, he receives from other individuals the other things which he needs. He thus becomes dependent upon others; but by becoming dependent he is himself enabled to become more skillful, more highly trained, and also to secure more time for personal development along other lines. This process is going on at an ever increasing rate, and we are rapidly achieving greater freedom as individuals through greater and more complete interdependence.

As we have already seen, human beings owe their superiority over the lower animals in intellect and in control over the forces of nature to their social group. The social group has also made possible drawing, music, painting, and architecture. Morality is largely a social product. Individual consciousness, itself, has been largely if not entirely developed out of, and is dependent upon, the social organization. From the beginning, human beings have lived together in social groups; they have worked together, have coöperated in various undertakings, have fought with one another. All this has produced the highest degree of individual consciousness, for we are never so conscious of our own individuality as when we meet with other individuals. We are seldom conscious of our eyes until they fail to function properly; when a cinder lodges on the eyeball we are acutely aware that we have an eye. So with individuals in society; when no one opposes us,

when our personalities do not clash with those of others, we are only mildly, if at all, conscious that we are individuals, but when opposition occurs, when some other individual gets in our way, then we become truly and acutely conscious, not only of the other individual, but also of ourselves as individuals.

When we say that society must provide for the development of the individual, we obviously do not mean the development of the power or capacity of the individual to do anything or be anything he individually desires to do or to be. Our natural desires and impulses would often lead us to do things which would interfere with the development of other individuals and with our own best good as well. Since, as we have seen, the best medium for the development of individuality is a normal human society, where the rights of all are taken into consideration, it therefore follows that in the long run each individual will realize his own highest development when he himself develops along those lines which interfere least with the proper development of others. We may say, then, that a secondary function of education is to provide for the development of the powers and capacities of the individual in so far as they do not conflict with the needs of society, or better still *in such a way* that they will not conflict with the social *needs*.

Individual and Social Good Not Opposed

While, for the sake of definiteness, we have considered these two aspects as separate and possibly somewhat antagonistic, they are fundamentally one;

there can be no real conflict. Discussions on the meaning of freedom and divergent views on the place of liberty in human conduct are for the most part based upon a common fallacy; they do not recognize the essential unity of the good of the individual and of society. Obviously the good of the individual is not secured by allowing him to do anything he pleases. Freedom in relation to human conduct is not liberty to do anything. In relation to the good of the individual it must be freedom to do those things that will best develop the individual in lines that we call good. Analysis will show that this can be achieved only by a definite limitation of the activities of individuals, the direction of activities along certain lines.

This may be illustrated by the attitude of two men, Smith and Brown. Smith refuses to be dependent upon anyone. He wants to be free to do whatever he pleases. So he makes his own clothes, he produces and prepares his own food, he goes nowhere that he cannot walk. Brown deliberately allows others to make his clothes, to produce, prepare, and serve his food and takes advantage of every opportunity to utilize street cars, trains, automobiles, etc., to transport him quickly from place to place. He specializes in some one line and by his products is able to pay for the service that he receives from others. Which of the two has greater freedom? Obviously Brown is much more of a free man. But he is so merely because *he becomes dependent* upon others. He is free to do the things he most wants to do because and only because he limits his activities to certain lines of work and allows others to monopolize other lines of activities. Or again, sup-

pose we refused to learn any particular method of lacing our shoes or dressing our hair or of using knife and fork and spoon but insisted on performing these operations in different ways each day. Would we be free? We secure freedom of action only by definitely forming habits of acting in certain ways. Then we can perform them quickly and with a minimum of thought and are free to give our attention to things much more worth while.

Perhaps the best illustration is seen in speech habits. If a man decided not to be bound down by any particular combination of sounds such as we have in the words of spoken language, but expressed or tried to express his thoughts and emotions in different ways each time he had any thoughts or emotions or in ways other than those recognized by others, would he be free to express his thoughts? Before he can be free to express himself, he must discipline his vocal organs so that they habitually form certain sounds that are for the most part invariable in their character. The same is true of expressing thoughts and emotions by music, by pencil, brush, or chisel. Freedom of action is dependent upon limitation of action.

On the other hand, society cannot progress unless it secures the development of the individuals that constitute it. The price of failure to provide opportunity for the individual has always been stagnation and decay. The new ideas and ideals that limit and cause the progress of society come from individuals alone, not from the mass. So from whatever angle we view it, the good of society and of the individual are not antagonistic, but essentially one.

The Objectives of Education

The two-fold aim of education which has just been discussed provides a very helpful point of view from which to consider the process, but it lacks definiteness; we need something more specific, some more definite points around which we can focus our ideas, some ends that are near at hand.

The Seven Objectives.—As a basis for this discussion we cannot do better than to take the very excellent list of objectives given in *Cardinal Principles of Secondary Education,* the preliminary report of the N. E. A. Committee on the Reorganization of Secondary Education.[1] This stimulating little pamphlet has rendered a great service to education throughout the country by directing our thoughts away from the ultimate, general aims usually discussed toward more definite and specific objectives. These furnish us a much better guide for educational procedure. The committee who prepared this report has selected and formulated the following seven objectives of education:

1. Health.
2. Command of the fundamental processes.
3. Worthy home membership.
4. Vocation.
5. Civic education.
6. Worthy use of leisure time.
7. Ethical character.

The point of view of the committee may briefly be summarized as follows:

1. The purpose of education is (1) To prepare the

[1] U. S. Bur. of Ed. Bul., 1918, No. 35.

individual to take his place as a member of society and (2) To secure his own highest development. This has already been discussed.

2. Preparation for society means preparation for efficient participation in the activities of society. Personal development, as we have seen, is also secured by the same sort of participation. Since both of these can be interpreted only in terms of the activities of individuals, the objectives of education must largely, if not wholly, be determined by the activities in which individuals engage or will engage.

3. All normal individuals engage in activities that center around (1) The vocation, (2) The home, (3) Civic relationships, and (4) Leisure time. These, it will be seen, constitute four of the objectives.

4. In order to make these activities effective each individual needs to have (1) Command of the fundamental processes, (2) Health and (3) Ethical character. These, while not, strictly speaking, activities in and of themselves, nevertheless underlie and predetermine the degree of efficiency of the participation in each of the four groups of activities mentioned. On this account we must include them among the objectives of education.

While these groups of activities constitute the major part of human activities, yet they do not seem entirely complete. The great majority of human beings also participate in activities that center around the church and religion. In this country we seem at present to be debarred from definitely and specifically preparing young people for such activities, so far as the public schools are concerned, but the need for it undoubtedly

exists and must be met. There can be little doubt that very definite and helpful preparation along this line is even now being given in our schools in spite of the legal restrictions usually imposed. Such preparation does constitute a legitimate objective of education, even though at present it may not properly be an objective of the public school. This has been recognized and discussed in Chapter II under the heading "Purpose of Education from the Standpoint of Religion."

Another objective that may properly be added, at least for the sake of emphasis, is that of school life. Education is preparation not only for participation in adult activities but also for those of childhood. For the child, school life and school activities constitute a large and important part of his total activities. Education should prepare the child for more efficient participation in the activities of the school. This might possibly be considered as part of the objective called "civic education," but the difficulty is that the term "civic education" does not, as usually interpreted, include school life. Few teachers seem to realize the necessity for such preparation, and, as a consequence, it is either neglected entirely or done in a haphazard manner that accomplishes very little.

Bobbitt's Objectives—Another very interesting list of objectives is that formulated by Franklin Bobbitt.[2]

These objectives are:

1. Social intercommunication, mainly language.

[2] Bobbitt, Franklin, *Curriculum Making in Los Angeles*, pp. 4–7. Used by permission of the publisher, The University of Chicago Press. Out of print.

2. The development and maintenance of one's physical powers.

3. Unspecialized practical labors.

4. The labors of one's calling.

5. The activities of the efficient citizen.

6. Activities involved in one's general social relationships and behavior.

7. Leisure occupations, recreations, amusements.

8. Development and maintenance of one's mental efficiency.

9. Religious activities.

10. Parental activities, the upbringing of children, the maintenance of the home life.

This differs from the previous list chiefly in a more complete analysis and in the addition of Religious Activities and Parental Activities as two of the desirable objectives.

George School Objectives.—Another helpful statement of the objectives is that made by Walter H. Magill in the George School Survey.[3]

1. The promotion of health and the desire and ability to care for the health.

2. The development of fundamental abilities, attitudes, and appreciations which should be possessed by all graduates of the school and are so general in their application that they are not readily included within a single one of the other aims.

3. The development of ethical character.

4. The development of the desire and ability to be a useful member of some religious organization.

[3] *The George School Survey*, pp. 11–14.

5. Aid in the selection of and preparation for a vocation.

6. Development of the desire and ability to discharge effectively the duties of citizenship.

7. The development of the ability to become a worthy and efficient member of a home.

8. Development of the desire, ability, and habit of making a profitable use of leisure.

9. Development of interest and ability in social intercourse.

10. Preparation for advanced study.

These aims are by no means exclusive; many interconnections and intercorrelations are present among them all. Each has its individual side and its social side. But they are helpful because each represents a series of situations in which that which is learned will be used; hence they give purpose and direction to education. They are helpful also because they enable us to break up the total aim into separate parts for more definite and careful consideration. They are guides along the way. If they are to serve the teacher most efficiently, each of these must itself be analyzed and broken up into specific habits, attitudes, interests, and ideals that may be developed in individuals.

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CHAPTER V

THE NECESSITY AND THE POSSIBILITY OF MAKING CHANGES

Physical Development Versus Social Development

While man has been able to change his physical environment and to control it to an ever increasing degree, to conquer the sea and the air, to harness the wind, the water, and electricity, while he has devised methods of intercommunication, and has developed marvelously in social, intellectual, and spiritual lines, he has not yet discovered ways by which his physical nature may be changed and developed to anything like the same degree. His more physical needs are not much above those of animals. He still must have food, clothing, and shelter. He passes through much the same stages of growth as do the higher animals except that the period during which he is dependent upon others for food and protection is much longer.

At the same time his physical environment has been most completely transformed. No longer can he depend upon his own physical powers to provide food by means of the chase or by fishing; much of it he must secure from others, at the store, and give in exchange other products that he has gathered or money which represents exchange value. It must be prepared for him in a rather intricate manner and served according to prevailing custom. Again, the skins of wild

animals slain by his own hand no longer are sufficient to supply his needs for clothing. The manufacture and sale of clothing constitute a complicated process; and the manner of wearing the clothing is by no means simple. Fashion or custom determines in large measure what shall be worn and how it shall be worn. Men and women now live in houses of wood or stone, with rooms set apart for special purposes, with doors and windows, with locks and keys, heated and lighted by an amazingly complicated arrangement.

When man wishes to get from one place to another, he no longer depends upon his own legs, but gets on a street car, a train, a steamboat, an automobile, or even an airplane.

When he wishes to communicate with one at a distance, he talks into an instrument, the telephone, or strikes dots and dashes on a metallic key, the telegraph, or makes peculiar marks on a piece of thin flat substance, a letter, places this in an iron box and has faith to believe that it will reach the one for whom it is intended and convey to him the message which he wishes to convey.

All of this merely shows how tremendously the physical environment has changed. If a savage from the Orinoco were placed in the midst of the traffic in one of our cities, he would be utterly unable to adjust himself. His nature and training has admirably fitted him to cope with his natural physical environment; but when he comes to the city, there is none of the natural left; it has been entirely transformed; it is man-made, artificial, and has become very complex.

These two facts, then, stand out with almost start-

ling distinctness: (1) Man's physical nature has remained practically unchanged, and (2) His physical environment has become transformed and its complexity has increased greatly. The inevitable result is that civilized human beings are not as well fitted at birth to take care of themselves as are animals, nor are they for a long time after birth. In order to earn a living, to provide food, clothing, and shelter, to exist, every human infant must be taught many things; he must go through a long period of preparation, that is, he must be changed in many ways; he must learn many things, form many habits, develop skills in many lines.

When we consider the social, the intellectual, the moral, and the spiritual part of his environment, we see a striking change. Practically every phase of modern civilized society has been so changed from primitive conditions as to be unrecognized; each worker produces only a very small part of any manufactured product. Great organizations have been built up; production, transportation, buying, selling, and exchange have become complicated and highly specialized occupations. Each of these requires different kinds and degrees of skill; each has its own facts that must be learned; each depends upon the formation of certain specialized habits.

The modern intellectual world is practically a new creation. Man has by nature little or no intellectual world. This he has made for himself. This is made up out of the facts, the inventions and discoveries made by the race in its upward progress. The longer the human race exists, the more facts are learned, the

more inventions and discoveries are made, and the more complex becomes his intellectual world. In consequence, the greater is the distance between mere physical man and intellectual man.

The same considerations hold for the moral and spiritual world. Whatever may be said about the religious sanction for moral ideas, it cannot be denied that the moral world today is vastly different from that of primitive man. This difference is due largely to man's experience. It is the result of trial, of invention, of discovery as truly as is the development in the field of mechanics, of chemistry and of medicine. It was not always considered wrong to kill another man. Among savage tribes it was not only legitimate to kill a member of another tribe on sight, but it was a duty which one owed to his tribe. The struggle for mere existence was very keen. When the interests of two tribes clashed, anything that would weaken one tribe was a benefit to the other. Consequently, if a man of one tribe would waylay and kill a member of another tribe, he was a public benefactor. If the man killed possessed something of worth, some valuable weapon or article of food, it was all the more important that he be killed. Theft, deceit, lying were all virtues if practiced against an enemy. Illustrations of all this can be found in the history of the ancient Hebrews. As tribes have developed into nations and nations have come closer and closer together, it has slowly, very slowly, dawned upon mankind that conditions which affect one part of a nation affect the whole nation, and more slowly still are we coming to realize that the whole world is united throughout.

What affects one part of the world, however remote, affects all alike. We are still far from complete realization of these principles; we still act as though we believed it right to kill another, even if he be innocent of wrong, provided it is done in war, and we still condone or even commend deceit and falsehood under certain circumstances. It is nevertheless true that the conditions under which these things may be done are continually being restricted and we are approaching, even though slowly, the ideal of a united, completely interrelated, interdependent world. This condition has been brought about by greater, more detailed knowledge of the effects, immediate and remote, of certain acts upon individuals and upon the race. It has been hastened greatly by the presence in the world of ideals crystallized from human experience by the seers and prophets of the race and kept alive by the acts and the thought of all who believe in the ideals.

We do not need to go back to primitive times to find illustrations of these facts; modern life is full of them.

In the eighteenth century lotteries were considered to be a very legitimate means for raising mony. When King's College (Columbia University) was founded in 1754, part of the money was raised by a lottery. Churches often resorted to the same means to secure necessary funds. Today lotteries are wisely considered detrimental and are illegal. This change is due entirely to a better understanding of the real effects upon men of attempting to get something for nothing. It has been found that the net effects of such methods and practices are bad. The present attitude,

legal and popular, toward the manufacture and sale of alcoholic liquors for beverage purposes is another illustration of the same development. Long experience combined with scientific study and careful analysis of causes and effects has convinced us that excessive indulgence in alcoholic liquors is detrimental to the race and that it is not safe to permit the manufacture and sale of such injurious products.

The change in attitude toward trusts and monopolies and other combinations in restraint of trade is due to the same process—a more definite, detailed knowledge of the effects of such combinations upon the life of the people.

Thus the world is continually progressing in its knowledge of the things that are harmful, in its analysis of the real effects of different acts. But this very progress operates to increase tremendously the complexity of the moral aspects of life. To do right means knowledge of effects as it never did before; mere impulse to do a thing is no longer a sufficient warrant for an act. When a man asks us on the street for money, we no longer believe that it is always right to comply with his request. Careful study has shown that to do this would be to injure the man rather than help him. More than this, we are responsible for knowing this.

It is clear, then, that to act right, knowledge of results is absolutely necessary. This means education. In order to act intelligently we must be taught what the race has discovered to be the effects of certain acts. The more the race learns about such effects, the more must we learn.

The Non-Transmission of Acquired Characteristics

The necessity for a long period of training for making these changes in human beings is still further emphasized by the fact that knowledge, language, habits of action and of thought, inventions, discoveries, ideals, and all the accumulated wealth of experience acquired by one generation cannot be transmitted through the germ cells to the next generation, but must be consciously, laboriously acquired by each individual for himself. Color of hair and of eyes, size of hands and feet, stature, facial characteristics and certain mental traits are inherited; but habits and facts are not. We may improve the race by careful selection, by taking steps to prevent the feeble-minded and certain types of criminals from having children; we may increase general physical health and mental vigor by proper food and care; but we cannot transmit from parent to child one bit of the accumulated knowledge of the past. No matter how learned a man may be, no matter how many things he may have invented, or how skillful he may be, no way has yet been discovered by which he can transmit through the germ cells to his children one fact, one habit, or one particle of his skill. These the children must acquire for themselves. This cold stark fact, that acquired characteristics are not transmissible, renders education absolutely necessary. It means that all of these changes and many others must be definitely and consciously made in human beings before they can take their proper place in human society.

The Possibility of Making Changes

No matter how necessary it might be to make certain changes, it would be useless to consider the question at all unless it were possible to effect the changes desired. We have already seen (Chapter II) how important a place modification of structure has in racial survival and development when confronted with a changed or changing environment. We have also seen (Chapter IV) how important it is, in the midst of our man-made complex physical and social environment, for an individual to be able to modify or change himself in such a way as to become adjusted to this environment. We must now consider what makes it possible to make these modifications.

To a certain extent all kinds of organic life, plant as well as animal, lower forms as well as higher, are capable of certain modifications in structure or behavior or both which adjust them better to their environment. With plants and the lower forms of animal life the possibility of change is very slight and extremely slow for the most part. It is accomplished more by social selection and survival than by a modification of the individual. It is also largely unconscious and is often due to chemical or physical reactions, to certain elements in the environment. This is probably the explanation of many cases of protective coloration, as in the case of the tree toad or the horned toad, where the color of the animal varies with its surroundings.

But such a process as this, slow and uncertain at best, will not meet the needs of education. Modifica-

tion must be effected quickly and surely and must be capable of being guided consciously in the direction of a certain objective. Obviously the mechanism possessed by plants and the lower animals is not sufficient for the purposes of the higher animals and man.

What is this mechanism that in the last analysis makes education possible? This mechanism is, of course, the nervous system. First of all, the nerve tissue is modifiable, is capable of being changed much more quickly and completely than any other part of the structure of the body. In some way, not yet thoroughly understood, connections are formed between systems of neurones. The finely divided ends of two neurones become, as it were, intertwined and so closely connected that the nerve impulse passes from one to the other. This growth or intertwining takes place as the result of something the individual does. This quality, or characteristic, is fundamentally the basis for education.

We also find this significant fact: that the higher up we go in the animal scale, the more quickly is the nerve tissue modified. That is, in higher animals and man the nerve tissue seems to be more sensitive and capable of quicker modification than is the case among the lower animals.

In the second place, as we ascend the scale of life, the nervous system becomes more complex, until in man we find a very complicated and highly organized nervous system. The chief difference between the nervous systems of man and the lower animals is that in man the cerebrum has developed so enormously in proportion that it almost completely covers the rest

of the brain. This cerebrum is made up largely of associative neurones.

We have already seen (Chapter III) the significance of these associative neurones. They are what make possible thinking and planning, and provide for an endless number of different reactions to a given stimulus.

The simile of a telephone system still holds true. If you are connected by direct wire with the house of a neighbor, you can communicate only with him; you cannot call up any one else. But if there is a central exchange you may in turn call up anyone of thousands or millions. This is made possible by the fact that one end of the wire of each of these thousands of private telephones is located in the exchange office and that the exchange operators also have many short wires by means of which they can connect any two wires at will. These short wires represent the associative neurones in the brain. Obviously, then, with an "exchange" such as the cerebrum, endless modifications are possible.

We may say, then, that it is possible to make changes in human beings because the nerve tissue is capable of being modified and also because the nervous system of man, especially the cerebrum, is so complex and highly developed that an endless number of changes or connections is possible.

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CHAPTER VI

THE ORIGINAL EQUIPMENT OF HUMAN BEINGS—THE RAW MATERIAL OF EDUCATION

The native equipment of individuals, as we have already seen (Chapter III), is based upon the presence of a nervous system and upon the fact that this nervous system is capable of being modified. No matter how desirable education might be, it would never be possible if the nervous system did not have this characteristic, and the greater the possibility of modification or change, the greater is the possibility of education. The basic thing in education is, thus, the nervous system. We have also seen (Chapter III) that the only means by which changes are actually made in the nervous system is the reactions or responses that the individual himself makes in response to stimuli. Not what is done to a person, but what he himself does, his acts, his thoughts, his feelings—these educate him.

But what determines how he will act and think? Is it mere chance? Can we predict to any degree of certainty what a person will do in response to a stimulus? If so, what makes this possible? Is education determined entirely by environment, by the stimuli presented? And will a given environment always result in the same habits no matter what or who the individual may be? Locke believed that the mind of the child was a *tabula rasa,* a blank page upon which was to be

written his experiences. Education was entirely the result of experiences; the child brought nothing, contributed nothing: everything was done to him. If this point of view were to be accepted, we could almost entirely control the development of every individual, and, as bees control the number of drones, queens, and workers by regulating the food of the larvæ, so we could determine the number of geniuses and leaders as well as the number of the "common herd" by appropriate environment.

Modern psychology has clearly shown that this is not true, but that even at birth the child has a certain equipment that to a large extent determines or at least limits his future education. This equipment consists of tendencies to act, think, and feel in certain ways. These tendencies that are inborn are called native tendencies to distinguish them from tendencies that are the result of training, called acquired tendencies. It is not always easy to determine whether a tendency is due entirely to inborn nature or is partly acquired. Careful experimentation has enabled psychologists to distinguish clearly many of the instinctive reactions, and others are obvious. We can, of course, confidently say that reactions that occur at birth are for the most part native. These native reactions are, in the last analysis, due to the inner nature of the individual: they are tendencies that are present potentially in the fertilized ovum. All characteristics, physical as well as mental, are thus conditioned or determined by the germ plasm. The color of eyes and hair, the pigmentation of the skin, height and weight, features of the face, voice, intellectual ability, special talents, all are

conditioned by elements in the fertilized ovum. So important are these native potentialities that we may definitely say that all that a man can become is present in the fertilized ovum nine months before he is born. His possibility of becoming an Angelo or a Raphael, a Chopin or a Mendelssohn, a Galileo or a Newton, an Edison, a Lincoln, or a ditch digger could, if we had instruments delicate enough, be determined at the beginning of his life in the uterus. Accidents, disease, food, care, unfavorable environment, all these may limit his development, but nothing can ever increase the native potentialities. Could we determine what the native equipment of each individual really is, our problem would be merely to provide environment that would develop the innate possibilities.

What, then, is this native equipment and how does it influence education? As we have seen, the native equipment of an individual consists of tendencies to develop certain physical characteristics as size, color of eyes and hair, proportions of the body, etc., and also tendencies to act, think, and feel in certain ways. These are called by Watson [1] hereditary modes of response. Both of these groups of tendencies are of immediate concern in education; but the second group is of far greater importance, and it is these tendencies that we shall consider. The primary emotions usually recognized are fear, anger or rage, and love.

What, then, are these tendencies that represent the native equipment of the individual?

Kinds of Tendencies.—Psychologists recognize two

[1] Watson, J. B., *Psychology from the Standpoint of a Behaviorist*, p. 194. Used by permission of the publisher, J. B. Lippincott and Co.

main kinds of these tendencies or hereditary modes of responses, emotions and instincts. It is impossible to make any clear line of distinction between these two modes of response, for each shades imperceptibly into the other and in many cases neither is present alone; the instinctive reaction often accompanies the emotion, and an emotional tone is often present in an instinctive response. On the whole, an emotion is more general, the instinct more localized. Watson states the difference in the following words: "a serviceable way to mark off an *emotional* reaction from an *instinctive* reaction is to include in the formulation of emotion a factor which may be stated as follows: The shock of an emotional stimulus throws the organism for the *moment at least* into a chaotic state. When in the first shock of an emotional state, the subject makes few adjustments to objects in his environment. . . . The subject in an instinctive act usually does something: he throws his hand up for defense, blinks his eyes, or ducks his head; runs away; he bites, scratches, kicks, and grasps whatever his hand touches. We may express our formulation in convenient terms somewhat as follows: when the adjustments called out by the stimulus are internal and confined to the subject's body, we have emotion, for example, blushing; when the stimulus leads to adjustment of the organism as a whole to objects, we have instinct, for example, defense responses, grasping, etc." [2]

Instincts are themselves of two kinds,[3] reflexes and

[2] Watson, *op. cit.*, pp. 196, 197.

[3] These are often listed separately; that is, three hereditary modes of response are given: emotions, instincts and reflexes.

instincts proper. The chief difference between these two modes of response is the greater definiteness of the former. Reflexes are often involuntary and often entirely unconscious; they are deep-seated and in most cases essential to the welfare of the body. Examples of these are winking the eyes when something touches the eyeball, the "pupillary reflex," or narrowing the pupil of the eye in response to a bright light, coughing, sneezing, etc. The "neural pattern," or the system of connected neurones, that corresponds to this is very simple. This may be a direct connection between a sensory neurone and a motor neurone, as shown in 1, Diagram III. This is called a two neurone arc. Or it may be what is called a three neurone arc, as shown in 2, Diagram III, where the sensory neurone is connected with an associative neurone and this with a motor neurone. Instincts other than reflexes are not so immediate nor so definite. Among these may be mentioned walking, crying, sucking, curiosity.

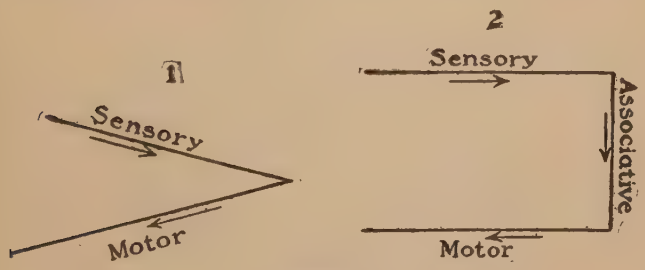

DIAGRAM III
NEURONE ARCS

While it is not possible to list completely the hereditary modes of response, the following list may prove

helpful in forming some idea of the extent and character of these responses that make up the native equipment of each individual.[4]

1. Physiological functions
   Breathing, sleeping, digesting
2. Reflexes
   Blinking, sobbing, vomiting, sneezing, yawning
3. Emotions
   Fear (of noises, black things, dark, high places) love, anger, jealousy, pugnacity, shame, etc.
4. General instincts
   Crawling, sucking, clasping, biting, laughing, crying, sitting, walking, vocalization, acquisitiveness, collecting and hoarding, curiosity, play, migration, gregariousness, imitation, general physical activity, general mental activity

It will readily be seen, even from this short list, what a variety of responses is included in the native equipment of individuals. Another fact of great importance is that not all of these tendencies are present at birth, but in some cases are delayed for several years. We may well believe that during the entire period from the time of fertilization of the ovum in the uterus to the time when the individual becomes adult these hereditary modes of response are being developed. Many are present and complete at birth, others are present in an imperfect state when the child is born, and still others do not appear until years after birth.

It is, of course, difficult if not impossible to separate hereditary responses from those that are acquired in

[4] Adapted from James, Thorndike, Watson, etc.

those cases where the response is supposed to be delayed in appearing; but among the responses usually listed as delayed are creeping, walking, rivalry, curiosity, and the various sex instincts.

Differences Between Animals and Man

It will at once be seen that these responses are by no means the exclusive possession of human things, but are shared by all the higher forms of animals. There are, however, several differences that should be noted that are of great importance from the standpoint of education. These differences, while they are mostly merely differences of degree rather than of kind, are significant.

In the first place, the hereditary responses of animals are more fully and definitely formed at birth and need no modification. They are more of the reflex type as seen in Diagram III, *i. e.,* they are definite neural patterns that produce a definite response; often this response is quick and certain. With this also goes the fact that these fixed responses are very difficult to change. Children have fewer of these definitely fixed neural patterns and so are not so well prepared to respond in useful ways to stimuli. But, on the other hand, they can more readily be changed. Another difference is that in the lower animals especially, a given stimulus produces a definite, fixed and simple response, while in a child the responses are neither fixed nor definite. He may and does respond in various ways to a stimulus. As an example of this, we might cite the reaction of a chick, a puppy and a

child to a rubber ball. To the chick the ball might be "something to peck at," *i. e.*, the response would be single, pecking it. The puppy would do a number of things, probably strike it, bite it, bark at it, run after it. The child would do many more things to it than would the puppy, pick it up, examine it, bite it, throw it, etc. This is of great importance because the more responses one makes to a thing the greater are the possibilities of developing useful habits with reference to that particular object.

It is relatively difficult to change the response of the chick; it is a great deal easier to change that of the child.

Origin of Emotions and Instincts.—It would be interesting if one could trace out the origin of all these hereditary modes of response. At present this is not possible. In general, it is believed that they represent, for the most part, modes of behavior that are now useful to the individual or were once useful to the race. Some that are not necessary for the individual in his present condition may represent the "vestigial remains" of responses that were once useful. This is an interesting topic for speculation, but it should be noted that it is not at all necessary to take the point of view that all of these were once useful. In biological development individual variation has often produced characteristics that were not only useless but actually harmful and in consequence the individual or the race possessing them was destroyed or gradually disappeared.

The Importance of Hereditary Modes of Response.—This brief description should bring out clearly the

fundamental importance of these hereditary modes of response.

It is clear that education is conditioned by the nervous system. It depends entirely upon the fact that the neurones are sensitive—that, when a stimulus acts upon them, something happens, a disturbance is set up, a nerve impulse is produced, and this nerve impulse spreads or travels from one point to another, setting up a disturbance in far distant parts of the body. A body that is not thus sensitive is dead and incapable of education. Education is also dependent upon the fact that this nervous system can be changed or modified, that the direction which the nerve impulse takes can be governed, that we can determine the parts of the nervous system to which disturbance will extend. Education is still further conditioned by stimuli. Granted that an individual possessed a sensitive nervous system and that this could be modified, nothing would happen to it unless a nerve impulse were started somewhere; and the only things that can start such disturbances are stimuli. If we could, in some miraculous manner, place a person with a normal nervous system in a "stimulus vacuum" he would, in all probability, relapse into a state of total inactivity. Some stimulus is absolutely necessary for the production of a nerve impulse. Of course, we must remember that stimuli are not merely external. Many are internal and produced by the various functions of the body, breathing, digesting, heart action, etc. But it is nevertheless true that stimuli are absolutely necessary for responses of any kind.

While education is conditioned by these things, it is

in no small degree conditioned also by hereditary modes of response. Let us say that the nervous system is normal, that it is sensitive and modifiable, and that stimuli are present and presented. What happens? As soon as the nerve impulse is produced it spreads and finds a "pathway" already formed for it, a set of connections already established, and inevitably tends to spread in the direction already determined for it by heredity. If this "pathway" is definite, nothing can at first prevent the nerve impulse from taking the direction already established. If this is not the best direction, other "pathways" must be laboriously developed. If the direction has not been definitely fixed, there is immediate need for conscious direction into "pathways" that are useful.

It is undoubtedly true that some of these ready-made responses are useful and that some few are harmful: most of them are, fortunately for education, neither useful nor harmful but may be made into useful responses.

The point to be stressed is that regardless of whether these hereditary responses are useful or harmful, definite or general, fully formed or only partially formed, they represent the raw material upon which all education must be built. We must accept them as the basis for all education; without them we would be helpless. It is, then, of the utmost importance that teachers, whose business it is to make the necessary changes that we call education, realize what this raw material is and how important are the hereditary modes of response with which the child is equipped.

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CHAPTER VII

METHODS BY WHICH THE CHANGES ARE MADE

We have already seen that education is dependent entirely upon the responses that individuals make to stimuli presented to them. In Chapter VI it was shown how the child has at birth certain ready made responses and other tendencies to respond. It is upon these that education must be based. It has also been pointed out that education is much more than the development of the natural tendencies to respond. Human beings are unlike the lower forms of animals in that they are not adjusted by nature to their environment. They must be carefully guarded for years and as carefully trained. They even must be made over, changed from their natural condition, in order to become adjusted to their environment. This is a conscious process and is called education. While no agencies outside the individual can produce the changes necessary, they can and do guide the process and in other ways profoundly influence both the kind and the amount of the changes that are made.

There are three principal ways by which that is done:

1. Weighting environment.
2. Rewarding desirable responses.
3. Punishing undesirable responses.

Weighted Environment

By a weighted environment we mean one which presents certain selected stimuli or from which have been taken other stimuli. The object of this is to make more probable the production of certain responses or to make it less likely that certain other responses will be made. When we hold up before a hungry baby his bottle, we weight his environment by providing a definite stimulus, and we know fairly well what the response will be. When, in case of sickness, we do not want the patient to drink water, we are careful not to have a glass of water where he can see it, in order to avoid the response which he is sure to make if he sees it. When on April first, the small boy puts a brick in a paper bag and leaves it on the sidewalk, he expects the first man who comes along to respond in the usual way and kick it. This again is weighting the environment! In the process of education we can so modify the environment of the child that certain stimuli may be presented which will be likely to result in desirable responses, and stimuli which would usually result in undesirable responses may be eliminated. That is, when we have decided upon the changes that are desirable, we select stimuli which will ordinarily call out the responses which will produce the changes. We thus weight the environment, or present a selected environment.

This is accomplished in a variety of ways. We provide by law that children under a certain age shall be in school and shall not be engaged in gainful occupations. This at once restricts and selects the environ-

ment. Stimuli arising from the necessity of earning a living, from shop or factory or store, from extreme fatigue are withheld, and the stimuli arising from happy association with other children, from the varied life of the school, from the influence of teachers and schoolmates are presented with unusual force. We provide a special building, properly lighted and ventilated, clean and safe, with helpful apparatus, selected books, and other equipment. The primary purpose of all of these is, again, to present a selected environment, such that certain desirable responses will be more likely to be made than if the environment were not so weighted. We provide expert teachers, part of whose business it is to modify this environment, so to present and withhold stimuli that only desirable responses will be made by each individual and the right kind of changes result. Finally, and probably most important of all, we present a selected curriculum, which is nothing but selected stimuli. The human race in its upward struggle has discovered that certain things are necessary for its very existence, for maintaining the standards of the race and for ensuring progress. These are represented by various habits, feelings, facts, ideals, attitudes, etc., which exist only as modifications in the nervous systems of individuals. The race has also discovered the stimuli which are most likely to produce these modifications. Some of the most important of these it has condensed and organized and presents to the child in the form of the school curriculum. We should, then, consider each subject of study as selected stimuli whose purpose it is to produce certain responses in the individual by

means of which desirable changes in the nervous system will take place.

One of the most effective methods of weighting the environment is to make the purpose for which the changes are made, conscious to the child in such a way that he will himself *wish* to make the changes. The popular aphorism "One man can lead a horse to water; but ten men cannot make him drink" is not necessarily true. Some one sagely remarked "Yes, one man can make a horse drink if he give him salt beforehand." There is real educational philosophy behind this remark.

Formal geometry may be very uninteresting to the boy, and he may get the lessons only under compulsion, but if a situation arises in which he needs to lay out a baseball diamond or a football field and must know his geometry to do it properly, an interest is at once created, and geometry is motivated, and he puts forth all his energy. The pupil has become conscious of the purpose of the geometry and sees the need for it. In some rather simple habits, with young children, it is probably more economical to effect these changes indirectly without the individual's being conscious that the changes are being made, but with older children and in the case of the more valuable changes it is certainly more effective to work with the aid of the pupil instead of without it. The best work is done when we can create a real need in the mind of the pupil for the formation of a certain habit, the acquisition of a certain fact or skill. Then, and only then, will the pupil put forth all his energy in making the changes desired; and they will be made quickly and certainly.

Of course we can never be absolutely sure that the responses we wish will be made. However careful we may be in our selection of stimuli, some individuals are likely to respond in unforeseen ways. The most we can do is to select the stimuli as carefully as possible and await developments; after the responses are made, we can utilize them for the formation of habits.

Rewarding Desirable Responses

We also influence the production of certain changes by encouraging desirable responses. We do this by approval, by rewards of various kinds and, in general, by making the results satisfactory to the individual. This result follows the law of our nature that resulting satisfaction tends to strengthen connections in the nervous system. This feeling of satisfaction may be merely the feeling of success, of having done something well, of being better or brighter than some one else; or it may be the approval of the teacher expressed in a nod or it may be the good-will and honor of one's fellow students; it may be a reward, a prize of some kind, higher marks, or commencement honors.

One great difficulty encountered by the teacher with this method is that of selecting ways of giving approval that will not tend to produce undesirable responses as well. We have found that money prizes, while they undoubtedly do give satisfaction and so tend to increase effort, result in unwise rivalry, in envy, in jealousy, and in working for the prize regardless of the methods used or of any value of the work itself. Continued approval, if carelessly given, too often re-

sults in inordinate self-conceit and utter disregard for others. When the resulting satisfaction comes or seems to come as a natural consequence of the act, the effort is most wholesome and is, for the most part, free from undesirable effects.

Punishing Undesirable Responses

No matter how careful we may be in weighting environment, in selecting and in withholding stimuli, the responses desired may not be made, and, until they are made, they cannot be rewarded. Very frequently the cause of this is found in a habit or an attitude already formed which interferes with the desired new habit or attitude. We might state this condition in terms of neurone action somewhat as follows: We wish to produce a certain action; this action is dependent upon the contraction of a certain set of muscles; contraction of these muscles is, in turn, dependent upon the passage of the nerve impulses to the muscle plates. If the nerve impulse does not go to the particular set of muscle plates, the desired action will not result. The reason why it often does not go into the proper muscles is that there already has been formed another connection, and, when a certain stimulus is presented, the nerve impulse automatically goes into a set of muscles which produce an undesirable action. A familiar example of this is in directing the movement of the hands while looking in a mirror. Here the image is reversed, and the difficulty is to make our hands move in a direction opposite to that in which they seem to be moving. The nerve impulse coming from the optic nerves

would, under normal conditions, be directed to a certain set of muscles which would cause the hand to move to the right; the problem is to make the nerve impulse go to another set of muscles which will result in the movement of the hand to the left. This is difficult because of the connection already formed. In order to form the new connection, the old one must be broken. This process is often necessary in education. This is the function of punishment—to weaken undesirable connections. This we do by making the result unsatisfactory or even painful. This, again, follows a law of our nature that an unsatisfactory or disagreeable result tends to weaken connections. Even though we may not believe in corporal punishment, we all use resulting discomfort as a means. It may be merely a look, a shake of the head, or it may be a word of disapproval, or a low mark, or longer hours of work, or inability to do other things which one wants to do, all of which are the same in principle and have the same purpose—to weaken or to break undesirable habits.

The principal difficulty with this method is to connect the unpleasantness directly with the undesirable response, to make it follow as a natural consequence of the act. The child who pulls the cat's tail and is punished by his mother for it too often connects the punishment, not with the pulling of the cat's tail, but with the presence of his mother; as a consequence, when the mother is not present, the cat is likely to suffer. If, however, the cat scratches the child, the resulting discomfort is connected directly with the abuse of the cat, and the action is not likely to occur again. In the case of cheating in examination, the punishment is

often connected with getting caught and not with the dishonest practice, and so fails of its object.

With this form of control, as with rewards, the great difficulty is to select methods of punishment that will not tend to produce undesirable responses. Corporal punishment in the form of whipping has been generally disapproved and discarded largely because it too often produces anger, resentment and even distaste for the school on the part of the one punished, and sometimes develops callousness and brutality on the part of the one who administers it.

This method, punishment, while often very necessary as an educational measure, never results directly in positive habits, but merely tends to break up undesirable habits and to inhibit undesirable responses. Its educational function is, therefore, very limited.

It is often possible to avoid the necessity for punishing by directing or shunting off the nerve impulse that would normally result in undesirable action into a pathway that would result in desirable or harmless action. The advantage of this is that it not only avoids punishment but also utilizes the nerve impulse for positive habit formation. Many illustrations of this method are seen in school work. The big overgrown boy has a tendency to boss and bully the younger boys. He is made a traffic officer or a policeman in the school organization and is responsible for good order and takes care of the younger and weaker children. Boys are constantly annoying the neighbors by the noise they make playing ball in the street, and by the danger of broken windows. A vacant lot is secured and the boys work hard clearing it and laying

out a diamond. They organize into teams and restrict their playing to the ball diamond. A boy likes to talk in a loud voice in school and argues and gets himself noticed. A debating team is organized and he becomes a member, thus affording a wholesome outlet for his impulses.

This is always the most economical method of control of those impulses that may result in undesirable responses. It is, however, often very difficult to devise methods by which that can be accomplished.

Illustrations

It may be helpful to give a few illustrations showing in a concrete way how the principles described are applied to certain phases of the process of education.

Handwriting.—We have already discussed in sufficient detail (p. 47) the changes necessary to be made in learning to write. Let us consider the methods used to make sure that these changes shall be made. The most important is that of the weighted environment. We arrange our school courses in such a way that ability to write is progressively necessary. We provide desks, pencils and pens, paper and ink; we set apart a period in the day when all the pupils of the room are doing nothing but learning to write; we provide teachers, experts in their line, to show them how to make the necessary movements and to see that they form these habits. The fundamental purpose of all these is to create conditions, to provide stimuli, which will be likely to produce the reactions in the child which will result in the changes desired. We provide re-

wards and punishments both in the way of approval and disapproval by the teachers, in the way of promotion or non-promotion, and in the social standing among the pupils which ability to do the required work gives. Finally, we have constructed standards and scales for measuring and determining the degree of skill attained. These help by giving an objective standard with which each pupil can compare his own work and judge for himself the success of his effort.

Arithmetic.—Mathematics is purely an abstract subject and deals with the number aspect, the quantity side of our environment. The psychological processes involved are correspondingly complex. Elementary school arithmetic is concerned mainly with the development of number concepts, the formation of certain specific number habits, and the application of these habits to the solution of more or less concrete problems. This application is for the double purpose of more firmly fixing the habits and of solving real problems. It often involves reasoning of a certain kind. To avoid complexity, we shall here disregard the processes involved in the formation of the number concept and deal primarily with the habit side.

Practically all arithmetical processes are artificial in the sense that they are distinctly a product of man as a social being. Because they are man-made social products they involve changes in the nervous system that must be made; they never would develop of themselves. Many of these changes consist in connections of the kind described on page 40. The nerve impulse coming to the brain in response to the sight or sound of the characters, 25 divided by 5, will, if the proper

habit is formed, automatically go on through the connection already made and result in the idea "5." The efficiency of arithmetical habits, as of any other habits, is determined by the degree to which the responses are automatic, and this is determined absolutely by the closeness and permanency of neural connections. When the habits represented by the four fundamental operations are formed, together with the modifications necessary in common and decimal fractions, the thing of principal importance is the development of the ability to choose the particular operation or operations necessary in any given problem. For example, in the problem "If one orange costs five cents, how much will five oranges cost?" the only point of difficulty is for the pupil to decide that this is multiplication. This is a simple sort of reasoning but it is the kind that involves classification. In the example "If one man can do a piece of work in five days, how long will it take five men to do it?" the successful solving of the problem involves classification of the operation as division or partition. Stated roughly in psychological terms, the successful solution of both of these problems involves connections in the brain by which the nerve impulse in the first case is switched, so to speak, to the neural centers corresponding to multiplication habits; in the second, to those corresponding to partition habits. This transition is often difficult for the child. If, after working for some time on problems like the first, he is given the second problem, he is likely to solve it as follows: "If one man can do a piece of work in five days, five men can do it in five times five days or twenty-five days." The difficulty is merely one of

failure to discriminate, an inability to classify properly. It is what psychologists call a response by analogy: the problems sound alike and the nerve impulse follows the line of least resistance, of closest connection.

In general, the methods by which the desired changes are produced are the same as that in other studies. Situations are devised in which the number aspect is prominent, in which direct stimuli are provided which will be likely to result in certain responses, number habits and number concepts. We try to help this process along by encouraging desirable responses and by inhibiting the undesirable responses. The primary purpose of arithmetic is, of course, to form habits that will be useful in life out of school. The point of view presented shows us why this is true. The response—the solution of the problem—comes as a result of the connection formed in the brain between certain sensory neurones and certain motor neurones. The nerve impulse resulting from a certain stimulus, in a certain situation, goes over the sensory neurones and then on to the motor neurones by means of which the response is made. Provided this connection has been firmly established, the likelihood of the correct response being made to a similar problem in life out of school is determined by the similarity of the stimulus in the situation out of school to the one in school in response to which the original habit was formed. Obviously if the stimulus is not the same, the nerve impulse may take another direction and never go through the connection formed previously. When this happens, the habit so laboriously formed in school is useless. The only way in which we can be sure such habits will function in

life is to make the situation in school which calls up the response as similar to that in out-of-school life as possible. Stated in another way we should form a habit in the way in which it will be used later. This is true not only of arithmetic, but of all other school studies. For generations the only arithmetic taught in the schools was formal, abstract mathematics in which there was little, if any, attempt to make any applications to actual conditions. During the past quarter century, however, the demand has become more and more insistent that we should teach practical mathematics and utilize the every day experience of the children to furnish material for mathematical problems. Many successful plans and devices are now in operation in progressive schools. We see school banks, where real money is used and business operations employed; problems are taken from the school gardens, from the home, the shop, the dairy, and from school life itself. These plans not only have the advantage of providing strong motives and developing real interest, but they give us a method by which the successful solution of the mathematical problem brings its own satisfaction and brings it in much the same way as that in life out of school. The result is a positive and definite strengthening of the connection which brings about a rapid formation of the desired habit. In spite of all we can do, there is still an element of artificiality about many of these plans. It is often difficult to create a situation in which the pupil will feel the same necessity for solving the problems that he does in life out of school. This difficulty will never be overcome until we provide shops, laboratories, gardens, gymnasiums,

playgrounds and other means through which we can utilize for educational purposes all the activities of the child and until we build the school curriculum around these activities.

Composition.—The primary purpose of composition, both oral and written, is to form connections between those neural complexes which we call ideas and various physical agencies by means of which these ideas are expressed in words. It represents an extremely complex psychological process. No attempt will be made to analyze this process; and the discussion will be confined to methods by which the connections are formed.

Stating the purpose of composition in another way, we may say that it is to enable the individual to express his ideas clearly and effectively. It always involves a purpose in the expression, which is usually social. That is, the usual purpose in the expression of an idea is to influence some other person either directly or indirectly.

The principal difficulty encountered here, as in arithmetic, is that of providing a properly selected environment, of finding situations that will appeal to the pupil, so that he will feel the need for expressing his ideas clearly and effectively. Here, again, we can find the key to the situation only by going to our out-of-school life and learning what the situations are that make us want to express our ideas to others. We ordinarily write only when we feel the necessity for writing, either to record something which we consider of value or to communicate to others what we think valuable and what we suppose they will think valuable. The necessity which we feel for expression depends largely upon

the value which we place upon our ideas or which we feel others place on them. When the teacher directs a pupil to write a theme or a composition, this feeling of value is entirely lacking and the motive that impels him to write is compulsion, fear of the teacher's disapproval, dread of low marks, or the feeling that if it is not written now a harder task will be imposed upon him. The motive, whether it be positive or negative, is, in any case, outside of the real situation: the stimulus is not at all like that in out-of-school life. It cannot be denied that a certain amount of good can be accomplished, a certain amount of skill attained, even by this method. The most effective method, however, is to create a situation in which the pupil will feel that his ideas are valuable and that in order to make others understand what he has to say he must express himself in good English and choose his words with reference to their effect on the people whom he wishes to influence. Methods which have this end in view are now in common use in our best schools, even in the primary grades. To accomplish this the teacher must begin with the ideas that the child has and try to create a situation in which he will feel that they are worth something, and must accept temporarily the child's form of expression of these ideas as a basis for the development of expression. The child who defined a toad as "a bird that hops when it walks and has no tail, almost," had an idea; he knew something about a toad; he knew that in one stage of its existence it had a tail but later it did not—"it has no tail, *almost.*" This idea is a nugget of gold for the the teacher, and the expression is by no means bad as a beginning. The

same may be said of the vivid and forceful, even though somewhat profane, definition of a bat given by a boy: "A bat is a nasty mouse with injy rubber wings and no tail and bites like the devil." It should be a rare joy to the teacher to find such an idea and even to have this initial expression of it. There can be no doubt that this boy knew a bat and that he had had some very vivid experiences with one. The task of the teacher is to lead the boy to a better and less offending form of expression: it would be difficult to find one that would be more forceful. This method has the same advantage as in the case of arithmetic: the formation of the proper connection. Success brings its own feeling of satisfaction. The pupil has succeeded when he has made himself understood, when he has interested his audience, when he has led his hearers to believe what he wants them to believe.

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CHAPTER VIII

METHODS OF HABIT FORMATION—PRACTICAL MAXIMS ON FORMATION OF HABITS

From the principles discussed in Chapter VII there have been developed certain practical suggestions regarding the formation of connections. These connections, since they are acquired connections, are habits. But we should think of them as including not only habits in the usual sense, but also ideals, interests, attitudes, and even emotions in so far as these have become habitual modes of response. They, of course, include facts learned.

The following suggestions apply more directly to the formation of habits as we usually understand the term, but most of them can also be applied to the formation of ideals, the development of interests and attitudes. They have been gleaned from various authorities, from Plato to modern psychologists, and represent the best modern opinion and practice.

1. *Habits are specific connections, not general ones, and must be formed in definite situations.* Teachers often have in mind vague general terms such as industry, accuracy, honesty, and reliability, as habits to be formed. At best these are vague and meaningless unless translated into more specific terms. Each one is in reality a bundle of specific habits. If we are to form the "habit" of honesty in a boy, we must build

this up in him by having him form a series of honesty habits in various situations—honesty in recitations, honesty in examinations, honesty in baseball, honesty in football, etc., etc. It often happens that people are scrupulously honest in one situation and not in another. So-called "general" habits are merely collections of habits developed in important typical situations. This is further illustrated by the commonly observed fact that the habit $3 \times 8 = 24$ is not the same as $8 \times 3 = 24$. Each must be formed, often, independently. Ability to spell orally does not imply ability to spell when the word is written.

2. *Each habit must be formed by itself. Habits do not necessarily spread to other situations than the one in which the habit has been formed.* What has been said above applies to this maxim. Many experiments have been performed and much has been written on this question. We do know that training in one field does sometimes spread to other fields, that a habit of honesty developed on the ball field does sometimes carry over to examinations in the classroom; but it *may not.* That is the difficulty; the only thing we can be sure of is the habit that has been developed in the *particular situation.* We should always attempt to provide conditions that are most favorable to spread to other fields, but *we must not depend* upon the carry-over taking place of itself. In other words, we cannot depend upon arithmetic to make the pupil accurate nor upon literature or music to make him sympathetic and cultured. Accuracy must be cultivated in all important situations; appreciation of the beautiful must be developed *wherever* beauty is found.

3. *Habits must be formed; they do not form themselves.* We cannot depend upon nature, unaided, to form the habits desired; if we want a habit to be formed, we must take the trouble to see that it is formed.

4. *Form a habit in the way in which it will be used.* The value of a habit is to provide for a desirable response when the *same situation* recurs. Therefore, we should be careful so to form the habit that when, in life outside the school, the situation occurs, the desirable response will be made. For years we have taught in our arithmetic classes methods of interest that are never used in banking houses and systems of bookkeeping no longer employed. It is absolutely necessary that the habits shall be formed in such a way as to make them useful and usable later in life.

5. *Never form a habit that must be broken later.* Some of the best illustrations of this are furnished in the old method of teaching beginning reading. The approved method long in use was to begin with the alphabet; after this was learned, words of a few letters were introduced, and gradually longer words were learned. In each case the beginner was taught to spell each word before pronouncing it. We now know that this order—letters, words, sentences—is not the psychological order of learning, but sentences, words, letters. The habit of looking at each letter before the word is recognized is not only unnecessary but actually harmful in reading, for we can recognize words without analyzing them into their letters just as we recognize our friends without knowing the color of their eyes and hair or the kind of clothes they wear. Again, the

habit of pronouncing each word as we read must later be broken when we come to silent reading. The habit of pronouncing each word is unnecessary in silent reading and seriously interferes with rapid silent reading.

6. *Decide in advance upon the desired degree of skill or proficiency to be attained in each habit with each individual.* It is by no means necessary to attain the same degree of skill in all habits. Some habits should be developed to the point of absolute accuracy, as in the fundamental operations in arithmetic, in pronunciation and spelling; others need not be. It is relatively unimportant to secure copper-plate skill in handwriting or complete accuracy in all geographical locations. The degree of skill that is necessary in each case is to be determined with reference to the value of the habit itself and to the skill desired in other habits. We must always consider the entire educational product, the whole range of habits, attitudes, and interests desired. Concentration on one set of skills may and does often result in lowering standards in other desirable skills. We must take all desirable outcomes into consideration and then decide upon the desirable degree of skill or proficiency in each. Unless we do thus set up a definite goal, we cannot know how long to continue drill nor when to stop.

7. *Make sure that the desired skill has been attained.* After the degree of skill is decided upon, do not take for granted that a given course of action will produce the necessary skill. Measure it; test it; make sure that it has been attained.

8. *Constant and careful supervision is necessary, especially in the initial stages, to ensure progress in the*

desired habit. The most important part of any habit formation is the initial stage. "Practice makes perfect" is true only when the practice itself is correct. The first pronunciation of a word in English or in a foreign language is vastly important. Not only does an initial mispronunciation interfere with the correct pronunciation later, but this habit must itself be broken before the correct one is formed. Care taken at the initial stages will often save much time later.

9. *Practice makes perfect.* Repetition is absolutely necessary in habit formation. There is no known substitute for repetition, drill, in forming habits.

10. *Each repetition of the desired response should be uniform and consistent.* What has been said in number 9 above applies here. In a rural school the children were directed to write each word in their spelling lesson ten times. The product of one little girl was as follows:

1. Groceries
2. Groceries
3. Groceres
4. Grocers
5. Grocers
6. Groces
7. Groces
8. Groes
9. Gros
10. Gos

The repetitions were neither uniform nor consistent, and the time spent on the exercise was more than wasted; it was harmful.

11. *Reward desirable responses.* Repetition is al-

ways necessary, but with it we should also associate some pleasurable outcome when this is possible, for satisfaction in the result of an act is a positive factor in habit formation. This reward may be merely the approval of the teacher; it may be a mark, or it may be promotion.

12. *Punish undesirable responses.* Just as reward assists in habit formation, so punishment assists in breaking harmful habits and clears the way for the useful ones.

13. *Secure attention during the process of learning.* Another positive force in the formation of habits is the attention of the learner. Such attention materially facilitates the formation of a habit.

14. *Interest in the desired outcome facilitates learning.* The interest of the learner also materially increases the rapidity of the formation of the habit.

We thus have four positive factors all of which should, whenever possible, be called upon in the formation of any habit: (1) Repetition, (2) Reward, (3) Attention, and (4) Interest. With these should be associated, on the negative side, punishment as a deterrent for the possible harmful connection.

15. *Utilize natural tendencies.* Work with nature whenever possible. Natural tendencies are already formed or partly formed connections. If they can be utilized, much time and energy is saved. Often an instinctive tendency can be utilized with only very slight modifications; it usually can be utilized at least in part.

16. The practical maxims of James on habit formation are always helpful.

a. "In the acquisition of a new habit, or the leaving

off of an old one, we must take care to *launch ourselves with as strong and decided an initiative as possible.*" [1]

b. "*Never suffer an exception to occur till the new habit is securely rooted in your life.* Each lapse is like the letting fall of a ball of string which one is carefully winding up; a single slip undoes more than a great many turns will wind again." [1]

c. "*Seize the very first possible opportunity to act on every resolution you make, and on every emotional prompting you may experience in the direction of the habits you aspire to gain.*" [2]

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[2] *Ibid.,* p. 147.

CHAPTER IX

EDUCATION AN INDIVIDUAL PROCESS

The point of view presented emphasizes a very important fact, that education is an individual affair. There never was and never can be such a thing as education *in the mass*. The changes that are education must be *made in individuals*.

All Education Self-Education.—This truth needs constant repetition. We are too prone to think that education consists of courses of study, of books, of laboratories, of outlines, of teachers. These are indeed helpful, if used intelligently, but they do not necessarily have anything to do with education. Unless all these cause and produce actual changes in Mary Brown and John Smith, for them there is no education, and courses of study, textbooks, laboratories, outlines and teachers might as well have not existed. In not a few cases even now they stand in the way of real education for they make it unnecessary for the pupil to think, to organize, and to supplement. It is no accident that some of the best educational theory and practice has developed out of situations where no textbooks and apparatus were available. In an investigation recently conducted, some of the most brilliant high school students frankly stated that, in their opinion, teachers interfered with their study and were a hindrance rather than a help. Education consists of habits, attitudes,

ideals, and interests which are formed in *individuals;* nothing else is education. If we wish to carry the analysis still further we will say that all education is *self*-education. It is conditioned upon and determined by the reactions or responses which the individual makes to the stimuli presented to him. These responses produce changes and these changes are education.

No matter what the environment, no matter how rich and varied the stimuli may be, if the individual makes no response, he cannot become educated. The environment of the blind man contains vistas that are as beautiful, colors that are as rich and varied as those presented to the normal eye, but for him they might as well not exist. Disease or accident has interfered with the mechanism by which the particular nerve impulse is sent along the optic nerve to the brain. No response is possible because no nerve impulse is received. So with the deaf man. The most beautiful music produces no response because something has happened to the mechanism by which the nerve impulse is transmitted to the auditory nerve. In neither case do changes result, because nothing happens to that particular part of the nervous system. The same fact holds true in other phases of education. On account of abnormal conditions, disease or accident, some children seem to receive little if any impression from what is said to them, and so cannot make the desired responses. Low vitality, adenoids, extreme fatigue, hunger, or many other things may cause such a condition. All efforts to make desirable changes under such circumstances are useless. The first thing to be done

is to remove the condition which interferes with the reception of the impression. Only then can we expect a reaction, a response.

We can talk for hours to a wax figure and bring before it all manner of useful apparatus, but no education results because it is not sensitive and can make no responses. But when we place before an active, wide-awake boy a saw, a plane and a hammer, the presence of these tools produces a series of responses or reactions. That is, he takes them up and uses them. Certain changes in his nervous system result. We call them habits and skills. These changes are education and are produced only by the individual himself.

The Curriculum Merely Outlines of Activities.—The only known way by which these habits, attitudes, and ideals can be formed is for each individual to form them for himself by something that he himself does, by his own activity. He alone can form the habits and develop the interests that make for him an education. Teachers and parents alike are powerless unless the young people themselves will do the things prescribed. Education is not something that can be given, nor is it something that can be forced on another; it can only be *achieved* by something each individual does. *Activity* of each individual student in the school is, then, the keynote of all school work and school organization.

Mere activity does not result in education. All people are active but not all receive an education. Education looks toward certain ends to be accomplished; it has in view certain specified groups of habits, attitudes, and ideals that individuals should develop.

Hence to be educational, activities should be directed, not haphazard. Therefore, the problem of the school is to provide outlines of activities which, if engaged in, will result in the desired education of each student. It is these outlines of activities that constitute the curriculum. That part of the curriculum organized as a course of study in algebra is merely a collection of outlines of desirable activities. Thus $(a + b)(a - b) = a^2 - b^2$ is merely a suggestion of an activity that, if the student repeats a sufficient number of times, will result in the formation of a certain habit that will always be constant. The further object is to provide a general concept, or rule, that will enable him to solve for himself certain problems. This rule is "The product of the sum of any two numbers multiplied by their difference is the square of the first minus the square of the second." The course in Latin is, likewise, merely a collection of outlines of things to do. Sum, es, est, sumus, estis, sunt; puella, puellae, puellae, puellam, puella, etc., are outlines of directed activities that, if engaged in, will result in certain desired habits, useful in performing other activities in Latin later.

If, then, this analysis is correct, any part of the school that provides suggestions of activities useful or essential to education must be considered as a part of the curriculum. Looking at an entire school program, we find that activities of students are provided for in all so-called "studies" regularly taught and also in certain other phases of the school such as clubs of various kinds, athletics, student participation in the government of the school, and in the very life of the school itself. Some of these, the "regular studies," are def-

initely and completely organized with an idea of progression; that is, those activities that will result in more fundamental habits are developed first; after these come those that develop the more complex habits. "Subjects" themselves differ greatly in this respect, some showing a clear and definite progression, as French and Latin, other showing little definite development from the simple to the complex, such as history and literature. The other parts of school life are usually not so well organized from the standpoint of definiteness of outline of activities or of progression. These are what have been called "extra curricular" activities. We can now see that this term is clearly inaccurate and should speedily be eliminated from our educational vocabulary.

The curriculum includes, then, all the educative activities for which the public schools are responsible. We can properly include in it all the "studies," activities, and exercises that are regularly outlined and programmed in the school.

At present there is a fairly sharp line of demarcation between the two types of activities described, those organized for the classroom and those organized for out-of-classroom life. This distinction is becoming less and less apparent in some phases of our school work. Socialized recitations and supervised study are changing the character of the work in the schoolroom, and debating and dramatic work and public speaking, formerly carried on as outside clubs, are now often regularly organized classes. No hard and fast lines can even now be drawn between the two lines of activities.

We thus see that the entire life of the school—class-

room activities and so-called extra-classroom activities —is merely outlines of activities for the purpose of producing certain changes in individuals.

Mass Education Impossible.—The final test of the value of method, of curriculum, of organization, and of all other forms of selected environment is, then, whether or not it actually produces the changes desired. What we call a good method, curriculum, etc., is one which with most individuals does result in the changes we have in view. A better method is merely one that tends to produce the desired changes more effectively or more economically. But while this is a legitimate use of the term "good method" or "better method," we must never lose sight of the fact that these changes are not made *en masse* but only *in individuals.*

To anyone who has carefully studied educational methods and modern psychology these statements are self-evident; they are even axiomatic. But when we look at actual school conditions we find little evidence of them. School authorities still think in terms of mass education. We shall see in Chapters X and XI what significance differences in individuals have for education. It is sufficient for us to say that, while it will be necessary for a long time to come to herd children in large or small groups for educational purposes, this should not blind us to the fact that the education of children in the class cannot be measured by the average changes made in the group as a whole but by the total changes made in all the individuals composing the group. Even though the average attainment may be high, the process for Mary Brown is not

complete unless she, Mary Brown, has formed those habits that are necessary. The center of education is each individual child, and its efficiency must be measured only by the changes that have taken place in each individual child. Teachers should heed the warning given on page 192, regarding the misuse of the results of standard tests and measurements. Whenever such tests cause teachers to lose sight of the individual and to substitute for him the general average, the mass, they are harmful.

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CHAPTER X

INDIVIDUAL DIFFERENCES

If education is an individual process, if its purpose is to make certain changes, produce certain results in individuals, the nature of these results and the methods by which they are to be attained must depend upon the nature of the individuals in whom the results are to be produced. If all children were alike, the process of education would be relatively simple. Its complexity is due in large measure to the fact that children are not alike.

Variation, a Biological Fact

One of the most significant facts of all organic life is that of individual variation. No two plants of the same species are exactly alike; no two leaves on the same tree are precisely similar. No two animals have exactly the same physical characteristics: each has its own individuality. Nature is not an automatic machine grinding out uniform products day after day, like silver dollars stamped in the mint. Each organism is the product of varying forces that in their combination are never alike. Among all related organisms there are, of course, clear and unmistakable resemblances and the more closely related the organisms, the more striking are these resemblances. Dogs, with

all their many varieties, have resemblances that are very clear: one could not usually mistake a dog for a horse nor even for a cat, although in cases they may seem strikingly alike. But the resemblances between fox terriers are certainly much more evident than those between a fox terrier and an Irish wolf hound; and even among fox terriers it is not at all difficult to prove ownership of one particular dog. Each dog is different from every other dog. This biological fact is, as we have seen, the basis for all organic development and, when the method for utilizing it was finally developed, has become the essential factor in human progress.

Individual differences are, therefore, facts of extreme importance and merit careful consideration. This is the more important because modern schools have almost of necessity stressed mass education. The tremendous burden placed upon every community by the ever increasing number of children who flock to our schools seemingly makes it necessary to group children in large classes and to treat them not as individuals, but as groups. The tendency in such a system is, like that in primitive times, to consider individual differences as disturbing factors in the class organization, and as far as possible to reduce or eliminate them. This, to a certain extent, is wise and efficient but there is a point beyond which it is extremely dangerous.

In Chapter IX we have seen that education can never be a mass affair; it is essentially and entirely an individual process. We must, then, give careful attention to the question of individual differences.

The Actual Differences Between Individuals to Be Educated

We will first consider what the actual differences are between people who are to be educated. A complete discussion of this topic would include all the differences, physical, mental, and spiritual, that occur among all types of individuals, old and young, white, brown, and black, male and female, idiots and geniuses. The limits of such a discussion as this will not permit even the beginning of a treatment of this kind, nor would it be immediately profitable, for we all recognize the fact that extreme differences exist and that some of these must be taken into consideration in education. It may, however, be helpful to consider in some detail the types of differences among children in the same school. That is, if we were to take an inventory of the children in any school, what are the differences that we would find? The following list will serve to point out the principal differences that would be apparent. In this list no attempt is made to be scientifically accurate in the terms used. There is also a considerable overlapping in some of the items listed. It is merely a general and suggestive grouping of differences.

1. Color of eyes, hair and skin
2. Texture of skin
3. Features of face
4. Height
5. Weight
6. Lung capacity
7. Condition of bones and tissues

8. Development of organs of body
9. Efficiency and functions of organs of body
10. Relative size of parts of body
11. Method of walking, standing, or sitting
12. Reaction time
13. Memory span
14. Kind and power of attention
15. "Mental ability"
16. Temperament
17. Methods of thinking
18. Skills
19. Knowledges
20. Habits
21. Attitudes, interests, ideals, etc.

Among the differences in habits, knowledges, skills, and the like that might be especially mentioned are:

1. Ability to express ideas
    a. In spoken language
    b. In written language
    c. In wood, metal, cloth, or other materials
    d. By lines, colors, etc.
    e. In musical sounds
    f. By facial or bodily expression
2. Skill in manipulation of figures
3. Skill in getting the thought from the printed page
4. Knowledge of various school subjects

These are some of the principal differences that would be apparent in an inventory of any school.

The Causes of Differences

What are the causes of these differences? In general we can say that there are two causes, heredity and

environment, that is, nature and nurture. Some of the differences would be apparent no matter what the training; others are caused in large measure by the environment. But while it is very easy to state this and to point out some, as color of eyes, skin and hair, features of the face, etc., that are the result of heredity, it is by no means easy to determine what part nature and what part environment play in other differences such as temperament, skills, attitudes, etc. Practically all differences in children of school age are the result of both nature and nurture working together. We are, however, certain of two things: (1) that with regard to almost every known characteristic, individual differences are influenced by distinct hereditary causes, (2) that environmental influences have a profound effect upon the development of many hereditary characteristics. Without attempting a complete list we may distinguish the following as definite causes of differences:

1. Hereditary characteristics (characteristics inherent in the fertilized ovum from which the child develops)
2. Race
3. Sex
4. Health
5. Nourishment
6. Secretions of the ductless glands
7. Accidents
8. Religion
9. Home conditions
10. Economic circumstances
11. Early companions

12. Schooling

Some of these, as race, sex, and health, are partly hereditary and partly environmental. Hereditary racial differences have to do largely with color of skin, eyes and hair, shape of head, and to some extent possibly with "temperament" and "mental ability." Environmental racial differences are chiefly those that center around the traditions, customs, and attitudes of mind that are part of the inheritance of the particular race. These disappear when an individual of this race is brought up by members of another race. Differences between the sexes are probably not so much due to heredity as we have supposed. There are, of course, physical differences, such as organs of reproduction, the size and shape of the body, the growth of hair, the size and character of muscles, etc. We are not entirely sure how much effect these have upon the differences found to exist between men and women. Some psychologists, as Watson, even doubt whether the maternal instinct, so called, is a distinct sex instinct, that it is due to hereditary influences entirely. Certain it is that the different attitude society has toward males as compared with females of the human species has much to do with so called "sex differences." The differences in dress, the continual inhibition demanded of girls with regard to certain kinds of activity and expression, the monopolizing by boys and men of certain sports and kinds of occupational activities, the social customs regarding courtship and marriage, the "place of woman" in the home in contrast with that of the man, all these have a profound effect upon so called "sex characteristics." Numerous

attempts have been made to prove men or women superior or inferior by nature in this or that characteristic. So far as can be determined at present it is safe to affirm:

1. That actual differences between members of each sex are far greater and more significant than differences between sexes.

2. That, so far as mental traits are concerned, there are practically no *native* sex differences of such an amount or nature as to make it necessary to take them into consideration in education. It may still be true that there are and should be differences between the sexes in function in the home and in the state. This might require differences in education, but these differences in education would be due, not to inherent sex differences, but to differences in social demands. Social demands have changed greatly and are likely to change still more. Woman's place and function today is far different from what it was even fifty years ago. If the differences between men and women are not due to inherent sex causes but to social demands, then we must look to the latter for our guides in arranging educational facilities and not to the former. Changes in education for women must also be made to meet or even to anticipate changes in social demands.

It must be remembered that each initial difference is itself the cause of other differences and often acts as a constant force in producing subsequent differences. Lameness, deafness, defective vision—each act as a constant and usually a retarding force in the develop-

ment of individuals. Similarly, unusual physical vigor, mental alertness, intellectual ability have a constantly accelerating effect upon the development of those possessing them.

The Extent of Differences

We are all conscious that many differences exist between individuals and that some of these are extreme. Adult human beings range in color of skin and hair from the blackest Negro of Africa through all shades, brown, yellow, red, to the white of the albino. They vary in size from dwarfs and pigmies, scarcely over two feet tall, to the giant of 9 feet and over; in weight, from 20 or 30 pounds to 300 pounds and more. They vary in intelligence from the idiot and imbecile to the genius. The difference in occupational interests and activities is extreme and becoming more pronounced every year. So likewise are the differences in religious beliefs and political affiliations. Thus we could describe differences with regard to almost every known human trait or characteristic.

To many who do not take time to assemble and analyze the facts regarding differences it seems that great differences are the exception, and, at least as far as education is concerned, the differences that do exist in the majority of people are small and comparatively unimportant. But such is not the case. In order to bring this more concretely before us, let us examine some data regarding the extent of the differences in a few of the categories listed on pages 124 and 125.

Physical Growth and Maturity.—First let us consider some of the many differences that appear in the course of the physical growth of young people.

Taking only the period of school life, the changes in mere physical growth are very great and of tremendous significance.

The following tables give the common facts regarding the changes in growth at the various ages:

TABLE I

SCHOOL CHILDREN AND ADULTS—HEIGHT IN CENTIMETERS[1]

	Height	
Age in Years	*Males*	*Females*
5	102.2	101.6
6	115.3	114.7
7	121.8	120.0
8	125.7	125.4
9	130.5	129.8
10	136.3	135.5
11	140.6	140.1
12	145.2	146.6
13	147.9	151.1
14	155.0	155.8
15	161.8	159.0
16	166.8	160.0
17	171.4	161.1
18	171.4	162.6

[1] Adapted from Baldwin, Bird T., *The Physical Growth of Children from Birth to Maturity*, University of Iowa Studies in Child Welfare, Vol. 1 No. 1, 1920. Used by permission of the publisher, the University of Iowa Press.

This table shows the average height of boys and girls at various ages from 5 to 18. Chart I shows the same facts graphically. The average height of males ranges from 102.2 centimeters at 5 years of age to 171.4 centi-

meters at 18 years. Females vary from 101.6 centimeters at 5 years to 162.6 centimeters at 18 years.

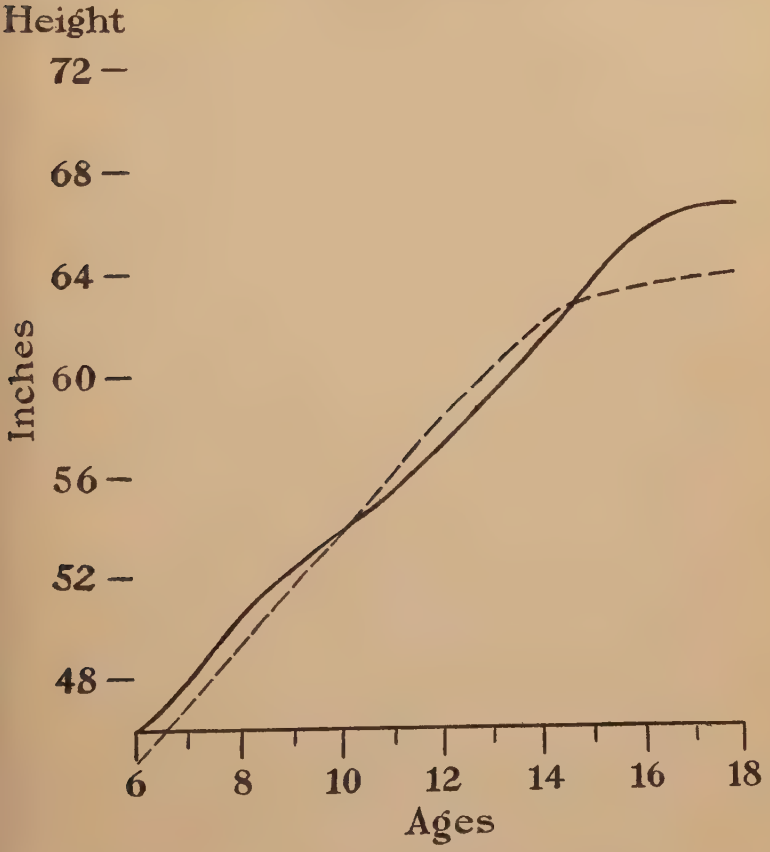

CHART I

MEDIAN GROWTH CURVES IN HEIGHT—BOYS AND GIRLS [1]

Boys: Continuous Line
Girls: Broken Line

[1] Adapted from Baldwin, Bird T.: University of Iowa Studies in Child Welfare, Vol. 1, No. 1, 1920, University of Iowa Press.

Not only do this table and chart show clearly the general growth, but they also show that the yearly increments are by no means regular. There is a time when growth in height, weight, and lung capacity is distinctly accelerated, as shown by the steepness of the curve on the chart. This begins for girls at about 11

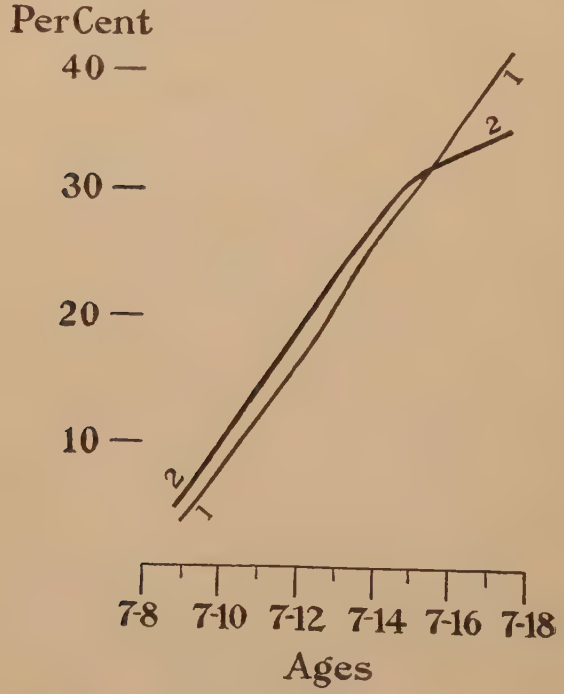

CHART II

PER CENT TABLE OF GROWTH OF BOYS AND GIRLS [1]

No. 1—Boys
No. 2—Girls

[1] Baldwin, Bird T., University of Iowa Studies in Child Welfare, Vol. 1, No. 1, 1920, University of Iowa Press.

TABLE 2

TOTAL PERCENT OF GAIN IN HEIGHT FROM 7 TO 17 YEARS OF AGE (Centimeters) [2]

Age	*Boys* *Percent of Gain*	*Girls* *Percent of Gain*
7–8	3.4	3.4
7–9	7.43	7.54
7–10	11.3	12.81
7–11	15.9	16.98
7–12	18.88	21.07
7–13	23.87	26.15
7–14	27.96	29.68
7–15	32.95	32.66
7–16	37.87	34.12
7–17	40.76	34.25

[2] Baldwin, *op. cit.*, used by permission of the publishers.

TABLE 3

YEARLY PERCENT OF GAIN IN HEIGHT FROM 7 TO 17 YEARS OF AGE (Centimeters) [3]

Age	*Boys* *Percent of Gain*	*Girls* *Percent of Gain*
7–8	3.4	3.4
8–9	3.9	4.0
9–10	3.6	4.9
10–11	3.5	3.7
11–12	3.2	3.5
12–13	4.2	4.2
13–14	3.3	2.8
14–15	3.9	2.3
15–16	3.7	1.1
16–17	2.1	.1

[3] Baldwin, *loc. cit.* Used by permission of the publishers.

years and for boys at 13 years of age. Note also the flattening of the curve for girls at 14 and for boys at

17, indicating that the rate of increase after these ages is comparatively small. These facts are best seen in Tables 2 and 3 and Charts II and III, which show the increments in height and weight at each age.

Table 2 shows the increment in height from 7 to 17 for boys and girls. It is read as follows: The gain in height of boys from age 7 to age 8 is 3.4%; from age 7 to age 9 is 7.43%; from age 7 to age 17 is 40.76%, etc. Chart II shows somewhat more clearly the period of rapid percentile increase in height.

Table 3 and Chart III give the same facts, but record

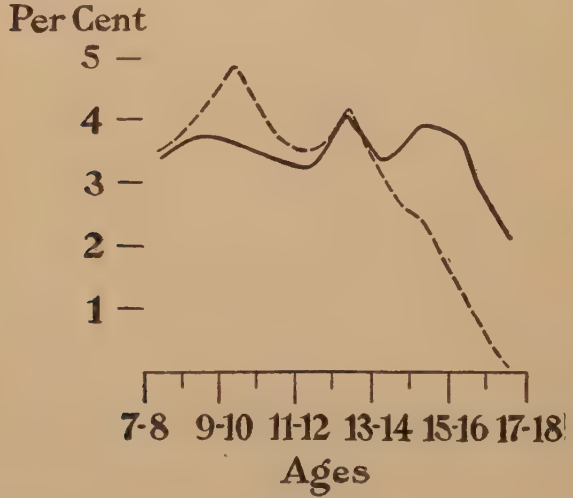

CHART III

YEARLY PER CENT OF GAIN OF BOYS AND GIRLS [1]
Boys: Continuous Line
Girls: Broken Line

[1] Baldwin, Bird T.: University of Iowa Studies in Child Welfare, Vol. 1, No. 1, 1920, University of Iowa Press.

the percentage increase by years. That is, Table 3 indicates that the increase in height for girls from ages 7 to 8 is 3.4%; from 8 to 9 is 4.0%; and from 16 to 17 is only .1%. Chart III shows that the greatest percentage increase for girls is between 9 and 10, and after 13 the percentage increase becomes continuously smaller until it is practically zero between 16 and 17. On the other hand, the greatest percentage of increase for boys is between 12 and 13, but even then not equaling the percentage of increase for girls between 9 and 10. However, the percentage of increase continues for boys up to 16 before showing any marked tendency to decrease, and at 17 the increase is still marked.

These charts also clearly reveal a unique difference in the beginning of these periods of rapid growth between boys and girls, the period beginning a year or a year and a half earlier in girls than in boys. That is, from about 10 years of age to 13 or 14 years, girls tend to grow more rapidly than boys, but for the next two or three years following this, boys tend to grow more rapidly than girls. Charts I, II, and III also show that not only is there this difference in the beginning of the period of rapid growth, but that on the average girls between the ages of 10½ or 11 and 14 are actually taller and heavier than boys of the same age.

Pubescence.—This is closely related to the period of physiological maturity called pubescence, which is marked most clearly by the maturing of the sex organs and the power of reproduction. The average age of pubescence for boys is 13½ or 14 years, for girls from a year and a half to two years earlier.

Range of Differences.—These facts by no means show the amount of difference between individuals; they are all based upon *averages* of thousands of individuals. If we have an average, it may mean that individuals vary greatly both above and below this average. Table 4 shows this clearly for height.

TABLE 4

FREQUENCIES OF HEIGHTS OF AMERICAN BOYS AND GIRLS OF AGES FROM 11.5 TO 16.5 YEARS
FREQUENCIES IN PERCENTS OF TOTAL AGE GROUPS [4]

Height in centimeters:	Boys: Age in Years						Girls: Age in Years					
	11.5	12.5	13.5	14.5	15.5	16.5	11.5	12.5	13.5	14.5	15.5	16.5
109–112	0.2	...	...	...	...	...	...	...	...	...	...	...
113–116	0.2	...	...	...	...	...	0.3	0.2	...	...	...	...
117–120	0.4	0.1	0.1	...	...	...	0.6	0.2	0.2	...	...	...
121–124	2.5	0.7	0.3	0.2	0.1	...	3.1	0.7	0.2	...	...	...
125–128	9.1	2.7	0.9	0.3	...	...	8.6	2.1	0.3	0.2	...	...
129–132	18.1	8.8	2.6	0.6	...	...	18.0	6.5	1.2	0.3	...	...
133–136	25.5	18.2	7.6	2.0	0.4	...	23.4	13.1	3.9	1.0	...	...
137–140	22.3	23.3	14.9	6.1	1.1	0.5	20.8	19.5	10.0	2.6	0.9	0.2
141–144	13.9	21.2	20.9	10.8	4.4	1.1	14.3	21.7	14.3	6.1	2.2	1.0
145–148	5.3	13.6	19.8	17.1	7.4	1.5	6.8	16.2	20.1	12.6	6.4	4.6
149–152	1.9	7.0	14.9	18.2	13.4	5.1	3.1	11.0	21.7	22.6	18.0	13.6
153–156	0.4	3.0	10.2	17.1	15.4	7.6	0.7	5.8	16.0	26.2	27.4	23.9
157–160	0.2	1.1	4.8	11.9	16.8	13.8	0.3	2.4	8.3	16.7	23.0	26.5
161–164	...	0.3	1.8	8.4	14.7	18.9	...	0.4	3.0	8.1	14.8	18.6
165–168	...	...	0.6	3.9	12.9	20.3	...	0.2	0.6	2.7	5.7	8.7
169–172	...	...	0.4	2.3	8.0	19.1	...	...	0.2	0.7	1.2	2.6
173–176	...	...	...	0.7	3.1	7.5	...	...	...	0.2	0.4	0.2
177–180	...	...	...	0.3	1.0	3.9	...	...	...	...	...	0.1
181–184	...	...	...	...	0.1	0.6	...	...	...	...	...	...
185–188	...	...	...	...	...	0.1	...	...	...	...	...	...

[4] Inglis, Alexander, *Principles of Secondary Education*, p. 11. Used by permission of the publisher, Houghton Mifflin Co.

This table may be read in one of two ways, as follows: (1) Reading vertically, boys who are 11.5 years old vary in height from 109–112 centimeters to 157–160 centimeters: 25.5% are from 133–136 centimeters in height and 22.3% are from 137–140 centimeters tall. The range in height of the other age groups is read in the same way. (2) Reading horizontally, the range in ages of boys who are from 137–140 centimeters tall is

from 11.5 years to 16.5 years; girls who are from 153–156 centimeters tall range in ages from 11.5 to 16.5 years. That is, 11½ years old boys vary in height

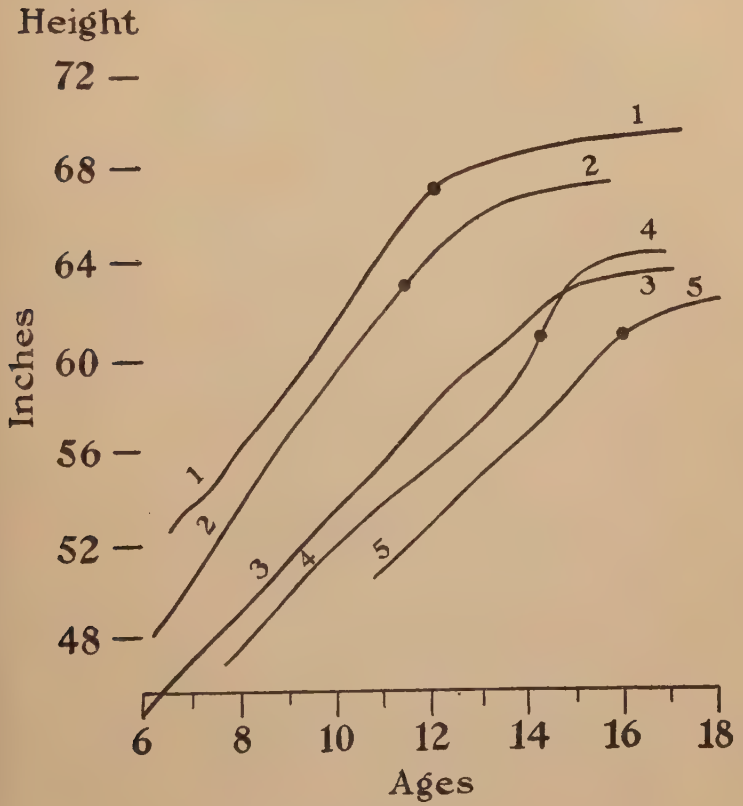

CHART IV

GROWTH CURVES IN HEIGHT, GIRLS

With beginning of pubescence (indicated by black dots) [1]

[1] Baldwin, Bird T., Fifteenth Year Book, National Society for the Study of Education, Part I, p. 13.

from 109 to 160 centimeters and 14½ year old girls vary from 125 to 176 centimeters.

Chart IV also shows a great variation in the time of beginning the period of rapid growth in height of girls,

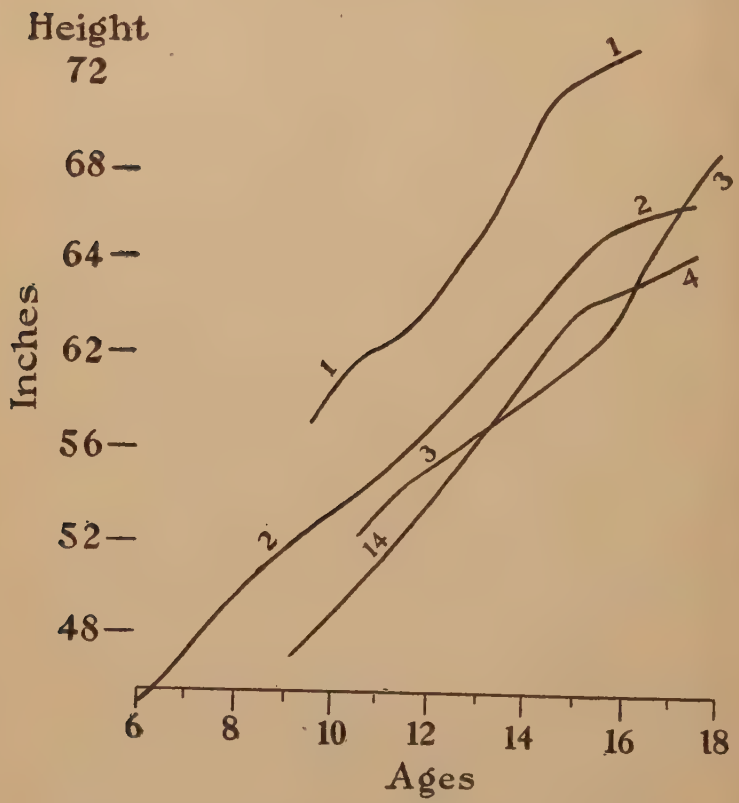

CHART V

INDIVIDUAL GROWTH CURVES IN HEIGHT, BOYS
Curve 2 is median height [1]

[1] Baldwin, Bird T.: Physical Growth and School Progress. Bull. U. S. Bur. of Ed., 1914, No. 10, pp. 22–50.

as indicated by the steepness of the curve, and a variation in the number of years over which this period extends. It also shows the relation of the beginning of puberty, as measured by the first menstruation (indicated by the black dots on the curves), to the period of rapid growth. The curve marked 3 represents the median of the girls measured by Baldwin. Curves 1, 2 and 5 are curves representing the growth of individual girls.

Chart V shows the growth in height of boys. Curve 2 is the median of the boys measured by Baldwin, while curves 1, 3, 4, and 5, represent individual boys. We also see here a marked difference in the time of beginning the period of rapid growth and a great variation in the length of time over which it extends.

TABLE 5

DISTRIBUTION OF BOYS BY CHRONOLOGICAL AGE AND BY PHYSIOLOGICAL AGE AS MEASURED BY STAGES OF PUBESCENCE [5]

Median Age in Yrs.	Prepubescent (immature)	Pubescent (maturing)	Postpubescent (mature)
12.25	(81)%	(16)%	(2)%
12.75	69	25	6
13.25	55	26	18
13.75	41	28	31
14.25	26	28	46
14.75	16	24	60
15.25	9	20	70
15.75	5	10	85
16.25	2	4	93
16.75	1	4	95
17.25	0	2	98
17.75	0	0	100

[5] Inglis, Alexander, *op. cit.*, p. 21. Used by permission of the publisher, Houghton Mifflin Co.

Tables 5 and 6 show the same variability in the period of pubescence.

TABLE 6

DISTRIBUTION OF 1241 GIRLS BY CHRONOLOGICAL AGE AND STAGES OF PUBERTY [6]

Median Age in Yrs.	Prepubescent (immature)	Pubescent (maturing)	Postpubescent (mature)
10.0	100.00 %	0.00 %	0.00 %
10.5	93.75	6.25	0.00
11.0	100.00	0.00	0.00
11.5	78.84	19.23	1.92
12.0	62.06	37.93	0.00
12.5	58,20	23.88	17.91
13.0	39.53	34.88	25.58
13.5	15.15	37.87	46.96
14.0	15.38	38.46	46.15
14.5	4.83	17.74	77.42
15.0	0.00	14.54	85.45
15.5	1.55	7.81	90.62
16.0	2.04	6.12	91.83
16.5	0.00	3.17	96.83
17.0	0.00	0.00	100.00

[6] Inglis, Alexander, *op. cit.*, p. 24. Used by permission of the publishers, Houghton Mifflin Co.

These tables indicate that the age of pubescence varies greatly for different individuals and show how misleading it is to make general statements regarding the chronological age when pubescence begins.

Chart VI shows the relation between the height curves of boys and those of girls. The curves marked B2 and G2 represent the medians and indicate the average differences in growth of boys and girls. The familiar crossing of the lines is seen between the ages of 11 and 14.

The most important conclusion from the chart is

that while girls are, *on the average*, taller than boys between the ages of 11 and 14, nevertheless there are many girls smaller than most boys and many boys

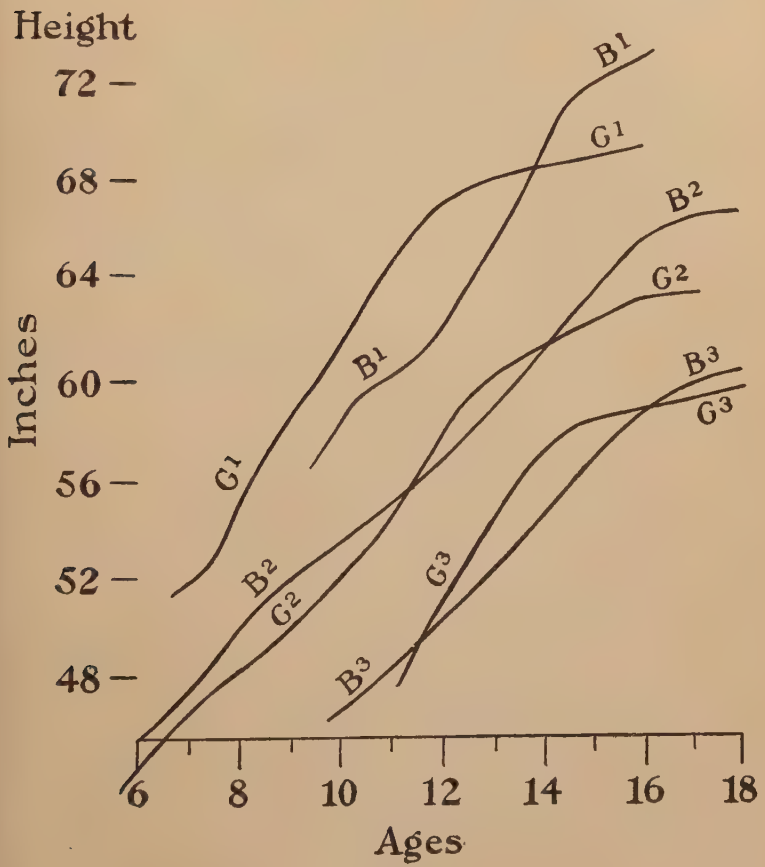

CHART VI

INDIVIDUAL GROWTH CURVES IN HEIGHT, BOYS AND GIRLS
Median Curves B^2 and G^2 [1]

[1] Compiled and adapted from Baldwin: *Op. cit.*

smaller than some girls after that time. This, again, shows the futility of considering merely averages; we must always keep *individuals* in mind and remember that a study of each individual is the only safe method to use in education.

We see, then, in these physical characteristics not only certain marked differences due to physical development, but also an almost bewildering variation between individuals in the age when these developments occur. We do not know all the causes of these differences. Some of them are probably due to race, social surroundings, climatic conditions, nourishment, and secretions of the ductless glands.

Significant Differences Based upon Physical Changes.

If these mere physical differences were all, they would have some significance for education, it is true, but they would be insignificant when we compare them with other differences that are more or less directly connected with them and that have a profound effect upon the nervous system and hence upon the whole process of education.

It is possible here merely to touch upon some of these differences. A more complete treatment of these may be found in the references given at the close of the chapter.

The tremendous increase in volume alone of bone and muscle and the increased nourishment demanded has an effect upon the individual that must be reckoned with in education.

Not only is this mass increase great, but it is not distributed equally. The size of blood vessels does

not increase proportionately with the heart, thus throwing an added burden upon this organ, which often results in incipient heart trouble. The high blood pressure probably affects the whole emotional life as well.

The development and maturing of function of the sex organs undoubtedly bring in new emotions, new interests, and new points of view. The unequal development of parts of the body sometimes results in throwing out of order former coördinations and causes awkwardness and maladjustments and necessitates redevelopment of certain habits and skills once learned.

Whether all of the differences described by Stanley Hall and commonly accepted by writers on the period of adolescence are really characteristic is doubtful in the extreme. It is very probable that the unusual has caught the eye too frequently and has been taken as an evidence of a common characteristic. Differences in innate mental ability, in home influences, in race, and in other causes, have often been confused with differences due to adolescence. It is extremely probable that the period of adolescence is not usually characterized by sudden and violent changes, by "storm and stress," by unexplained contradictions. It is easy and often very interesting to make sweeping and hysterical statements of the startling changes that take place in young people, but there seems to be little scientific basis for these statements at present. Most reliable data indicate that the rate of mental development is relatively constant, at least up to the ages of 17 or 18.

The most sane and commonsense point of view to take is that whatever changes do appear have their

basis in the years previous to the onset of puberty, are rather gradual in appearing, and are not cataclysmic normally.

There is a gradual development of new interests, of new motives for conduct, of new points of view. All these should be utilized when they appear and should be developed sanely and wisely into useful channels.

Reaction Time.—Another difference between individuals that has very real educational significance is that of reaction time or quickness of response to a given stimulus. This is one of the most easily measured of all responses and has been the subject of experimentation in psychological laboratories for a long time. In its simplest form the experiment is conducted as follows: The subject is seated at a table with his finger on a telegraph key. This is connected electrically with a revolving cylinder upon which is recorded time in seconds. The paper upon which this is recorded is divided in such a way that divisions up to one thousandth of a second can be detected. The experimenter tells the subject to be ready to press the key as soon as he receives a certain stimulus. Usually this is a flash of light, a sound or a touch. The subject knows in advance what stimulus is to be given and is prepared to receive it by a "Ready" signal just before the stimulus is given. Then the stimulus is given, and the subject presses the key as soon as he can. The apparatus is so arranged that at the instant the stimulus is given a mark is made on the cylinder and another when the subject presses down the key. Even though this is such a simple performance, the reaction time varies greatly between individuals.

There are many other kinds of reaction time experiments, such as "choice reaction," where the subject has to choose between two stimuli and react differently depending upon the one given. Another more complicated reaction is that called "associative reaction." One of the common forms of this experiment is to respond to a word by the next word that comes into your mind as—stimulus: "apple"; response: "sweet" or "red" or "Baldwin." These two reactions take much longer than the simple reaction time, and the individual variation is much greater.

The following table shows the characteristic differences between individuals and between simple and associative reactions:

TABLE 7

REACTION TIME
REACTION TIME OF ADULTS EXPRESSED IN THOUSANDTHS OF A SECOND—AVERAGE OF 14 TRIALS [7]

Subject	Reaction Time	
	Simple Reaction	Associative Reaction
1	153	565
2	155	1034
3	155	1328
4	166	739
5	167	1094
6	177	425
7	182	1063
8	191	1283
9	206	1380
10	218	773
11	226	668
12	228	751
13	230	1268
14	240	680
15	249	917

[7] Delabarre, E. B., "The Force and Rapidity of Reaction Movements," *Psychological Review*, IV, pp. 621–629 (1897).

This shows that the fifteen adults varied in simple reaction time from 153 thousandths of a second to 249 thousandths of a second, and in associative reactions from 425 to 1380 thousandths of a second. It should further be noted that those who reacted most quickly in the simple reactions were by no means the same ones who reacted most quickly in the associative reactions.

These differences would be most significant wherever quickness of action was important, as in typewriting.

Memory Span.—Another marked difference in children is that of memory span, or the ability to hold in memory for a given length of time a certain number of letters, words, digits, etc. The examiner reads slowly the digits, letters, syllables, etc., and then asks the pupils to write down the ones they remember in the order in which they were given. In the experiment that formed the basis for Table 8 the examiner read the digits, one to each second, in series of 3, 4, 5, 6, 7, 8, 9, and 10. The distribution shown in this table is entirely typical.

The differences are seen to be very great. For example, the 104 six-year old children varied as follows: 3 recalled only three digits and 3 recalled six digits. Of the 274 fourteen-year old children, 9 recalled only four digits, while 5 recalled ten digits. The average number of digits recalled was 6½.

Such differences as are here seen would materially affect the ability of an individual to do the work of the school. Those who could hold in memory 10 digits obviously could learn their work much more rapidly than those who could hold only 4.

TABLE 8

MEMORY SPAN FOR DIGITS
CHILDREN IN THE ELEMENTARY SCHOOL[8]

Age	No. of Cases	Number of digits recalled							
		3	4	5	6	7	8	9	10
5	5	1	4						
6	104	3	65	33	3				
7	248	6	110	93	25	14			
8	300	2	90	108	62	32	6		
9	288	2	66	110	59	43	7	1	
10	316		52	95	80	70	16	3	
11	329		26	102	94	78	25	4	
12	404		25	113	120	97	43	6	
13	431		9	108	92	138	53	30	1
14	274		9	65	64	84	29	18	5
15	92		3	23	17	38	5	1	5
16	22		1	4	6	5	2	3	1
17	1			1					
Totals	2814	14	460	855	622	599	186	66	12

[8] Humpstone, H. J., *Some Aspects of the Memory Span Test*, p. 21, Psychological Clinic Press, 1917.

Reasoning Ability.—Common observation shows a tremendous difference in reasoning ability among individuals. Many measurements have been made of various kinds of reasoning ability. Bonser tested the ability of children in the intellectual interpretation of poems and found the differences as indicated in the following table.

This table is read as follows: Eight boys between the ages of 8 and 10 showed 0 ability to interpret poems, two showed ability 9, and two ability 10. Between the ages of 14 and 16, two girls showed 0 ability, four 6 ability, and two 9 ability. The total range of abilities is from 0 to 18. The value given to the abilities is, of course, arbitrary and indicates the scores made in the tests given.

TABLE 9

FREQUENCY OF ABILITIES IN INTELLECTUAL INTERPRETATION OF POEMS[9]

Ability \ *Age*	8–10		10–11		11–12		12–13		13–14		14–16	
	B	G	B	G	B	G	B	G	B	G	B	G
0	8	10	14	7	19	9	12	5	13	1	3	2
1	6	8	13	18	12	16	21	8	11	5	3	2
2	2	7	19	15	16	15	19	18	11	13	3	1
3	2	3	6	12	14	16	10	19	5	5	4	1
4	1	3	10	6	13	11	5	7	3	5	1	1
5	1	3	6	6	8	6	4	9	5	7	3	3
6		5	4	4	3	3	11	6	2	3	3	4
7	2	1	2	2	7	5	8	5		1	1	
8	1	1	2	2	3	2	2	1		1	1	
9	2		1	4	1	5	2	6	2	2	1	2
10	2	1	4	1	3	1		7		1		
11		1	1	1	1	3	1	2		1		
12			1						1			
13				2							1	
14										1		
15			1		1	1						
16												
17							1					
18				1								
Cases	27	43	84	81	101	93	96	93	53	46	24	16

[9] Bonser, F. G., *The Reasoning Abilities of Children*, Teachers College, Columbia University, Contributions to Education, No. 37, 1910.

Mental Ability.—Every teacher is fully conscious of a great range in mental ability among the pupils in his class or room. We cannot yet define with any degree of certainty just what this "mental ability" is. We know that it is made up of various abilities; that it is complex; but we cannot separate it out into its elements. All that we can say is that it shows itself in the way in which a pupil does his school work, in how he thinks, in how he solves problems, and in various other important situations in life. We know that methods

of measurement of mental ability are not entirely satisfactory as yet, but they are sufficiently accurate to enable us to get a fairly clear notion of the differences that actually exist. Individuals range from the prodigy to the feeble-minded. The distribution between these extremes is approximately as indicated in the following table of classification of school children entering the first grade of our public schools:

TABLE 10

PROPOSED CLASSIFICATION OF ENTERING SCHOOL CHILDREN
(adapted) [10]

Type	*Number per thousand*
Prodigies	30
Super-typical	120
Typical-average	700
Sub-typical—sub-normal	120
Feeble-minded	30

[10] Horn, J. L., *The American Public School*, p. 265.

These are only a few of the many differences that exist among individuals; others are given in the next chapter. Even though they are but samples, they serve to show how wide is the variation among individuals who seem so nearly alike.

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CHAPTER XI

THE EDUCATIONAL SIGNIFICANCE OF INDIVIDUAL DIFFERENCES

Importance of Differences.—It is difficult to overestimate the significance of the conception of individual differences. It will profoundly affect every aspect of education. If education is an individual process consisting of changes in individuals, both the particular changes to be made and the method of making these changes will necessarily depend upon the nature and needs of the particular individual in whom the changes are to be made. If a child does not have the mental equipment that will make it possible for him to develop an abstract idea, it will be useless to attempt to have him develop one, to study algebra let us say. If his native reaction time is very slow, he can never become an expert typist. If he has unusual musical or artistic ability, this will and should effect the education he receives. Differences, then, put the limit upon changes to be made, and point the way to possibilities of other desirable changes that may be made.

Again, differences condition methods of teaching. The method used in teaching reading or arithmetic to a child low in intelligence, dull in comprehension, and slow in learning is radically different from that used in the case of a child who is high in intelligence and quick in learning.

Wherever we touch the teaching process, we find the same principle holds true that what we teach and how we teach it must be determined by the nature of the individual who is to be taught.

This does not necessarily mean that we must have separate teachers for each individual. We shall still be able to teach in groups; but it does mean that we should attempt to arrange children in groups that will be more homogeneous than they now are with respect to those characteristics that are important, and that we will suit the instruction to and measure the results by the individual pupils.

Differences Not Necessarily Harmful.—Another point should also be stressed. Differences between pupils in the same class are not necessarily hindrances to teaching. Homogeneity in groups is not always or necessarily desirable. We should always remember that it may be possible that certain differences in the group may be actually desirable, may make the teaching more effective. In other words, our point of view should be to *utilize* differences in the group for more efficient teaching, where this is possible, instead of trying to reduce or eliminate differences. Modern education has turned its back alike upon the idea of *suppression* of individual tendencies as a basis for educational procedure and upon the idea of accepting individual instincts, interests, and tendencies as guides. It now bases its philosophy upon the idea of utilizing instincts and tendencies for educational purposes. They are considered as so much motive power that can be harnessed to do the work of education. In like manner

we should look upon many differences in pupils. A class in history or literature or science would be a dull, uninteresting, and unprofitable place if all children in the class had exactly the same ideas. They learn, as we learn, by the clash of ideas, the different contributions of individuals in the group, the give and take, the discussion by the members of the class. One of the bases upon which people differ regarding the desirability of coeducation in high schools and colleges is this very question. Some think that sex differences interfere with the educational work of the school; others believe that the life of the school is richer, the teaching more effective, just because these differences are present. The point of view of the former is elimination of differences; of the latter, utilization of differences.

One of the big problems of method is to discover which of the many differences found among individuals interfere with the process of education and which may be utilized for more efficient education, and, having found them, to devise ways by which they can most efficiently be used.

The most important and perhaps the most difficult educational problem for society is that of distinguishing between differences in individuals; of finding what differences are harmful and what are useful; of discovering and inventing methods of suppressing the former and developing the latter. Individual variations in form and structure, in growth, in action and thought are inevitable biological facts; they cannot be suppressed; they will result either in destruction or

progress. Whether it is destruction or progress depends entirely upon the ones that are suppressed. This task society has placed on education.

The Extent to Which Schools Now Provide for Individual Differences

If this is the task placed by society upon our schools, it might be well to find how fully our schools as now organized attempt to provide for these differences.

The old type of school was largely unorganized. All pupils of every age and degree of development were in one room, very much the type of school we now find in many rural districts, the one-room rural school. In this country this type of school has gradually been supplanted by the graded school in which we have various rooms or grades. These rooms or grades are supposed to contain children who are alike at least in having mastered a certain part of the curriculum.

It was discovered that the most efficient teaching could not be done in a schoolroom containing pupils all the way from the 5-year old, who was just learning to read, to the 18-year old who was studying algebra and Latin. Time could be conserved, teachers could specialize and be better prepared, and the general tone of the school could be improved by dividing the pupils into groups where the variation was not so great. This brought about the present graded system by which we have from 20 to 50 pupils in the same room and grade. The purpose of this, as we have seen, was to reduce differences among the individuals in the same group.

Let us examine some of these groups and see to what extent the individuals are actually alike.

Chronological Age.—One of the bases upon which grades are organized is chronological age. The general idea is that the normal child should start the first grade at the age of six and progress through the various grades taking a year for each. Thus the normal ages for each grade are considered to be as indicated in Table 11:

TABLE 11

NORMAL AGES BY ONE YEAR SPAN

Grades	1	2	3	4	5	6	7	8	9	10	11	12
Ages	6	7	8	9	10	11	12	13	14	15	16	17

Any who are older than the indicated age for the grade are considered as overage, and any younger are called underage. Sometimes a two-year span for each grade is considered normal. According to the two-year span, the normal ages for each grade would be as in Table 12:

TABLE 12

NORMAL AGES BY TWO-YEAR SPAN

Grades	1	2	3	4	5	6	7	8	9	10	11	12
Age	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18

The extent of differences in chronological age in any given grade may be seen by reference to any age-grade table. Table 13 gives a typical distribution:

This table shows that the ages of pupils in the second grade vary from 5 to 16, and in the ninth grade from

TABLE 13

DISTRIBUTION OF ENROLLMENT—GRADES ONE TO TWELVE. October, 1921
PATERSON, NEW JERSEY

Age	ELEMENTARY GRADES								HIGH SCHOOL				GRAND TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	
5	323	11											334
6	1326	325	4										1665
7	650	1088	341	11									2090
8	166	578	909	304	30		2						1989
9	42	226	606	924	359	19	4						2180
10	17	68	234	585	753	314	34	1					2006
11	13	35	80	275	593	756	302	27	2				2083
12	7	16	47	137	321	566	647	289	32	2			2064
13	6	7	24	69	168	350	579	580	317	21	2		2123
14	3	4	19	15	85	140	301	452	590	198	16		1823
15	1	4	6	11	37	39	79	165	309	361	157	29	1198
16		1	3		7	6	9	32	54	152	184	115	563
17						1		7	9	27	80	129	253
18										4	16	75	95
19									2	2	1	17	22
20									1		1	2	4
21									2	2	1	3	8
Total	2554	2363	2278	2331	2353	2191	1957	1553	1318	769	458	370	20,490
Below nor. age	323	336	345	315	389	333	342	317	351	221	175	144	3,591
Normal age	1976	1666	1515	1509	1346	1322	1226	1032	899	513	264	204	13,472
Above nor. age	255	361	413	507	618	536	389	204	68	35	19	22	3,427

1 Annual Report of the Board of Education, Paterson, N. J., 1921–22.

11 to 21. Ten-year old children are distributed from the first grade to the eighth grade, and 15-year old boys and girls from the first grade to the last year of high school.

It is thus very apparent that our schools as now constituted do not group according to chronological ages; at least, differences in chronological age are so great as to warrant the conclusion that our schools do not consider it a matter of primary importance.

Height and Weight.—With this great difference in chronological age we may expect to find correspondingly great differences in every physical characteristic. Tables 14 and 15 show the differences in height and weight of pupils in the various grades:

TABLE 15

WEIGHT OF BOYS (POUNDS) IN 9A GRADE[2]

Weight	Distribution
60–69	2
70–79	7
80–89	10
90–99	33
100–109	28
110–119	15
120–129	17
130–139	4
140–149	2
150–159	2

[2] Kieffer, John C., *A Study of Some Physical and Mental Aspects of Preadolescence, Adolescence and Post-adolescence, 1926* (unpublished).

Table 14 shows that both boys and girls in grade 7 of the New Britain school vary in height from 51 inches to 68 inches. In grade 9 the variation is almost as great, boys varying from 54 inches to 69 inches, while

TABLE 14

HEIGHT OF BOYS AND GIRLS BY GRADE [1]

Grade		Inches																		
		51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	Total
											BOYS										
7	Cases	2	2	6	6	16	13	19	21	25	18	14	9	10	9	4	2	1	2	0	179
	Per Cent	1	1	3	3	9	7	11	12	14	10	8	5	6	5	2	1	1	1	0	100
8	Cases	0	1	0	1	5	8	15	15	11	12	10	4	10	8	9	4	1	3	0	117
	Per Cent	0	1	0	1	4	7	12	12	9	10	9	3	9	7	8	4	1	3	0	100
9	Cases	0	0	0	1	0	4	4	6	4	12	12	9	7	9	7	3	2	4	3	87
	Per Cent	0	0	0	1	0	5	5	7	5	13	13	10	8	10	8	4	2	5	4	100
	Total Cases	2	3	6	8	21	25	38	42	40	42	36	22	27	26	20	9	4	9	3	383
	Per Cent	1	1	2	2	5	7	10	11	10	11	9	6	7	7	5	2	1	2	1	100
											GIRLS										
7	Cases	3	2	2	5	13	16	24	16	27	23	17	12	8	3	6	0	1	1	0	179
	Per Cent	1	1	1	3	7	9	13	9	18	13	9	6	4	1	3	0	1	1	0	100
8	Cases	0	0	0	3	1	5	8	6	22	8	18	12	20	15	6	1	2	0	0	127
	Per Cent	0	0	0	3	1	4	6	4	18	6	14	9	16	12	4	1	2	0	0	100
9	Cases	0	0	0	0	1	1	4	1	2	12	14	12	15	8	11	5	0	1	0	87
	Per Cent	0	0	0	0	1	1	5	1	2	12	14	12	15	9	11	6	0	1	0	100
	Total Cases	3	2	2	8	15	22	36	23	51	48	49	36	43	26	23	6	3	2	0	393
	Per Cent	1	.5	.5	2	4	5.5	9	6	13	11	12	9	11	6	6	2	1	.5	0	100

[1] Leal, Mary A., *Physiological Maturity of Pupils in the Public Schools of New Britain, Conn.*

girls range from 55 inches to 68 inches. This great disparity in height in the same grade presents some problems that are by no means simple. A boy over 6 feet tall is often embarrassed and humiliated because he is associated in the same class with one who is scarcely over 4 feet tall. Desks have to be adjusted, recitation seats need to be specially arranged for the different sizes of children.

Table 15 reveals an almost equal difference in weight of boys in the beginning class in high school. The weight varies from about 60 pounds to over 150 pounds.

Physiological Maturity.—So much has been written about mental and emotional differences due to physiological maturity that it would seem that we should take these into account in providing for differences. To what extent is grading of pupils in our schools based upon stages in physiological maturity? Physiological maturity is a term used to indicate in a general way the stages of development of organs of the body; that is, the degree of maturity of functions of organs of the body. Three stages are generally recognized: (1) immature, (2) maturing, and (3) matured. While no exact measures have yet been devised that will enable us to decide with certainty the precise time of entering or leaving each stage, certain indications are fairly well marked. Among these are pubescence or growth and coloration of hair on the body, development of sex organs, and appearance of second molar teeth.

The following table shows the pupils in certain grades who are in various stages of physiological maturity. The variation is characteristic.

TABLE 16

STAGES OF PHYSIOLOGICAL MATURITY AND GRADE [3]

BOYS

	Grade 7		Grade 8		Grade 9		Totals	
	Cases	Percent	Cases	Percent	Cases	Percent	Cases	Percent
First Stage—Immature	98	51	33	27	12	8	143	31
Second Stage—Maturing	79	41	62	51	55	38	196	43
Third Stage—Mature	13	8	25	22	78	54	116	26
Total	190	100	120	100	145	100	455	100

GIRLS

First Stage—Immature	22	11	5	4	0	0	27	6
Second Stage—Maturing	94	49	36	27	20	14	150	32
Third Stage—Mature	76	40	90	69	120	86	286	62
Total	192	100	131	100	140	100	463	100

[3] Leal, Mary A., *Physiological Maturity of Pupils in the Public Schools of New Britain, Conn.*

In Table 16 we see that pupils in grades 7, 8, and 9 are in all the different stages of physiological maturity. Very few boys in the seventh grade, only 8%, are matured, while 51% are still immature. In the eighth grade, 33% of the boys are immature. This proportion, of course, may vary from year to year, but it does indicate that in these grades a considerable proportion of boys are immature. In the case of girls, we find that more are in the second and third stages, maturing and matured; in grade 9, 86% are matured. This agrees with the data already given on the earlier maturity of girls. The important fact to note in this connection is that in grades 7, 8 and 9 there is by no means uniformity in physiological maturity. These differences at once demonstrate that we cannot take for granted that schools including grades 7, 8 and 9, the junior high school, should be organized solely for the adolescent, since they have nearly a quarter of their pupils immature. The most evident fact revealed is the mixture of immature, maturing and matured pupils.

Sex.—It is sometimes said that sex differences are marked and should be provided for. This is apparently not a vital question in our public schools, since all elementary schools and the vast majority of high schools are entirely coeducational. The least we can say is that our public schools do not consider the matter of sex differences sufficiently important to provide separate schools for boys and girls.

Mental Ability.—We have already seen how great are the differences among pupils in what is called mental ability. It is not necessary to point out that such differences materially affect the rate of learning, the quality and quantity of the educational product, and the subjects that can profitably be pursued. To what extent do our schools recognize these differences? At present we have two rough measures of mental ability, the I. Q. or intelligence quotient, and the M. A. or mental age.

Mental age is a more or less technical term to indicate the ability of an individual compared with the average ability of individuals of the same chronological age. For example, a mental test is given to thousands of children ten years old. The average score is computed. This average is taken as the standard for ten-year old children and is called a mental age of ten years. An individual child is tested by the same test. If his score is the same as the average score of the ten-year olds tested, he is said to have a mental age of ten years, no matter what his chronological age may be. Thus, a five-year old boy may have a mental age of ten, or a fifteen-year old girl may have a mental age of ten.

The intelligence quotient is a measure of the relation-

ship between mental age, as determined above, and chronological age. It is the quotient obtained by dividing the mental age by the chronological age, or $\frac{\text{M. A.}}{\text{C. A.}} = \text{I. Q.}$ Suppose a boy shows a mental age of 12 years in the tests given and he is twelve years old. Chronologically, his I. Q. is $^{12}/_{12}$, or 1. A boy twelve years old chronologically and ten years old "mentally" has an I. Q. of $^{11}/_{12}$, or .83. A girl whose chronological age is ten and whose mental age is twelve has an I. Q. of $^{12}/_{10}$, or 1.20. Thus the intelligence quotient is a rough measure of mental ability as compared with the mental abilities of individuals of the same chronological age.

Table 17 shows the variation in Intelligence Quotients of boys and girls in grades 7, 8, and 9. It also

TABLE 17

INTELLIGENCE QUOTIENT AND GRADE [4]

BOYS

Grade		*Intelligence Quotients*														
		70	75	80	85	90	95	100	105	110	115	120	125	130	135	Total
7	Cases	1	4	15	14	35	26	25	17	20	7	6	5	3	1	179
	Per Cent	1	2	8	7	19	14	14	10	11	4	4	3	2	1	100
8	Cases	0	4	5	11	10	19	14	20	12	9	4	4	2	3	117
	Per Cent	0	3	5	9	9	16	12	16	11	8	3	3	2	3	100
9	Cases	0	4	3	11	19	21	21	13	12	6	4	2	2	3	121
	Per Cent	0	3	3	9	15	17	17	11	10	5	3	2	2	3	100
	Total Cases	1	12	23	36	64	66	60	50	44	22	14	11	7	7	417
	Total Per C.	1	3	6	9	15	15	14	12	10	5	3	3	2	2	100

GIRLS

7	Cases	0	3	7	9	29	34	29	31	14	11	7	2	2	1	179
	Per Cent	0	2	4	5	16	19	16	17	8	6	4	1	1	1	100
8	Cases	0	2	9	11	19	21	27	15	9	6	4	2	1	1	127
	Per Cent	0	2	7	9	15	16	21	12	7	4	3	2	1	1	100
9	Cases	0	2	4	7	21	26	20	19	16	8	5	2	1	0	131
	Per Cent	0	2	3	5	16	20	15	15	12	6	4	1	1	0	100
	Total Cases	0	7	20	27	69	81	76	65	39	25	16	6	4	2	437
	Total Per C.	0	2	5	6	15	18	17	14	9	6	4	2	1	1	100

[4] Leal, Mary A., *Physiological Maturity of Pupils in the Public Schools of New Britain, Conn.*

shows the percentages under each I. Q. In grade 7, the Intelligence Quotients of boys range from 70 to 137 and of girls from 75 to 135.

Tables 18 and 19 give the difference in I. Q. and M. A. for grades 7 and 8 as found in Pennsylvania in 1922:[5]

These tables show the enormous differences in the two grades studied. In mental ages, the children in grade 7 range from 8 to 18 and in grade 8 from 8 to 22. In intelligence quotients, the children in grade 7 range from 55 to 155 and in grade 8 from 55 to 175. Surely these differences are altogether too great for efficient teaching.

Achievement.—The most generally accepted basis for classification of pupils in grades is homogeneity of achievement in school subjects. To what extent are our pupils alike with respect to achievement? Practically all studies of the results of standardized tests show tremendous differences in the same grade. The following tables, pages 166 and 167, will show this clearly:

The tests used as the basis for this study are standardized tests, worked out after careful trial and experimentation and given to thousands of children throughout the country. The Comprehension Reading Test is designed to reveal the ability of the individual to understand the meaning of a given amount of reading matter after a definite length of time is given for its study. The scores are indications of the degree of comprehension of the material read. The Accuracy

[5] *Schoolmen's Week Proceedings*, University of Pennsylvania, Vol. IX, pp. 69–84.

TABLE 18

PERCENTAGES OF VARIOUS MENTAL AGES IN GRADES 7 AND 8 IN PENNSYLVANIA IN 1922

Grades	Mental Ages														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
7	1.0	3.2	9.7	19.0	24.6	20.9	12.9	6.0	1.6	1.0	0.1				
8	0.2	0.3	1.7	6.3	11.8	22.0	20.6	16.8	11.1	6.2	2.3	0.4	0.1	0.1	0.1

TABLE 19

PERCENTAGE OF INTELLIGENCE QUOTIENTS IN GRADES 7 AND 8 IN PENNSYLVANIA IN 1922

Grades	Intelligence Quotient												
	55	65	75	85	95	105	115	125	135	145	155	165	175
7	1.1	5.6	13.6	21.7	26.7	15.7	10.3	3.2	1.5	0.5	0.1		
8	0.1	1.6	6.2	17.9	26.2	19.3	16.4	8.0	2.8	0.8	0.4	0.2	0.1

Test in Arithmetic attempts to measure the degree of accuracy of an individual in performing a certain number of operations in arithmetic in a given time. The scores are the number of operations or examples correctly performed.

These tables reveal a condition that is found in the great majority of schools today. In silent reading, the scores made in each of the six divisions range from nearly 0 to over 45. It is impossible to do effective work in any of these grades when comprehension in silent reading differs so widely as this. In accuracy in arithmetic, the range is nearly or quite as great, ranging in grades 6B from 40–49 to 230–239. Thirty pupils in this grade are above the median attainment of those in the 8B grade. The same difference in achievement is revealed in all other subjects, but these are sufficient to show that, whatever our theory is, we are not securing anything that approaches homogeneity in achievement in the grades of our public schools. Extreme differences are the rule rather than the exception.

The Extent to Which It Is Desirable that Schools Should Provide for Individual Differences

The preceding tables show that, whatever may be the purpose of the schools, they are not at present securing homogeneous groups in their grades and classes. In view of these facts, we may well question whether the schools consider it worth while to try to provide for homogeneity in teaching groups. Certainly the task would be absolutely impossible if we were to attempt to secure homogeneity with reference to all the differ-

TABL
DISTRIBUTION OF READING SCO
IN GRADES

Grades	0–8.5	8.6–11.5	11.6–13.5	13.6–17.5	17.6–18.5	18.6–19.5	19.6–20.5	20.6–21.9	22–23.5
6A	12	22	21	27	14	11	4	21	15
6B	7	9	9	28	6	6	10	20	11
7A	8	10	20	34	11	10	14	5	9
7B	4	5	9	15	8	13	8	10	8
8A	1	7	6	19	6	5	6	19	19
8B	1	4	1	12	4	5	3	11	11

[6] Garver, Francis M., *Misplacement of Children in Grades Six, Seven*

TABL
DISTRIBUTION OF ARITHMETIC S
IN GRADES

Grades	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149
6A	1	2	10	16	27	37	31	31	22	18	8	4
6B		2	2	15	9	24	25	27	19	17	9	8
7A			1	2	9	17	26	36	56	32	29	30
7B			1	2	5	13	18	26	24	24	14	20
8A			1	1	8	14	21	37	38	29	31	23
8B				4	3	4	8	17	25	38	17	23

[7] *Ibid.*, p. 129.

E 20
RES COMPREHENSION MONROE
6, 7 AND 8 [6]

Scores

23.6–25.2	25.3–26.9	27–29.9	30–34.9	–35–39.9	40–44.9	45–47	Total	Median
5	10	14	9	6	5	2	198	19.3
10	4	17	15	6	3	0	161	21.6
13	12	11	19	15	5	0	196	20.2
17	6	16	21	16	13	5	174	24.6
18	17	26	37	37	25	5	253	27.3
16	9	11	34	30	21	13	186	30.9

and Eight in a Large City School System, 1920, p. 25.

E 21
CORES (ACCURACY, CLEVELAND)
6, 7 AND 8 [7]

Scores

150–159	160–169	170–179	180–189	190–199	200–209	210–219	220–229	230–289	Total	Median
1	1	1	0	0	0	0	0	0	210	95
4	2	2	2	1	0	0	1	1	169	103
30	5	9	3	1	1	0	1	0	288	116
15	5	6	3	3	4	1	0	1	185	120
19	12	6	3	1	4	0	0	1	249	121
13	9	6	5	0	1	0	1	0	174	125

ences mentioned. The result of such an attempt would be to do away with teaching groups entirely and to revert to individualized instruction.

The previous discussion should have made clear the fact that homogeneity is not necessarily the most desirable condition to secure in teaching. If, by some miracle of efficiency, we could secure a reasonably large group of pupils who were alike or nearly alike in all respects, this very likeness would render the teaching less effective. We have already seen that the presence of certain differences actually enriches and makes possible more effective teaching, while other differences seriously interfere with effective learning. Our task is to discover what differences do interfere with learning and provide in some way for securing groups that are as nearly alike as possible in these respects; and, in cases where differences assist, to provide for groups in which the differences are present.

Methods and Devices Used to Reduce Differences

Educators have not been blind to the importance of the questions raised by the presence of differences. In various parts of the country, several methods have been tried out in the attempt to secure greater homogeneity, to reduce such differences as seem to be detrimental to good teaching.

Homogeneous Grouping.—One of these that has frequently been tried is grouping according to certain abilities. We have already seen the kinds of differences that exist and the extent of these differences. The method of "homogeneous grouping" attempts to

select certain abilities or characteristics and provide groups in which the wide differences are reduced, since we cannot hope to eliminate them entirely. The two characteristics most frequently taken into consideration are so-called "mental ability" and degree of control of subject matter. That is, the basis for division is the grade, and the pupils of a given grade are divided according to mental ability. There are various methods employed for making the initial classification into groups. One is the use of intelligence tests; another is the average marks or grades received by the pupils in their school subjects; another is the estimate of each teacher of the ability of the pupil. Frequently a combination of these is taken. These are supposed to represent roughly the various abilities of the pupils to do the work marked out for the next term or year. This ability is considered in terms of time—rapidity of learning, or quantity in a given time—and quality. Pupils thus selected are divided into three or more groups. In each of these groups the range of abilities is much less than in the whole class or grade. On this account varying standards of attainment in quantity and quality can be established for each group, and methods can be employed which are better suited to the needs of each group.

No plan for making the classification has been found to be entirely satisfactory. There are several reasons for this:

1. "Intelligence" tests are not entirely adequate to test general mental ability.

2. Other things than "intelligence" are involved in "ability to do the work of the school." Some of these

are interest, persistence, obedience or at least willingness to follow directions. If a pupil has little "intelligence" but has these other characteristics he may succeed, while a brilliant pupil lacking them may fail.

3. Pupils may change; they may overnight develop interest; their attitude may change, and, consequently, their work may show immediate improvement.

It is therefore not so important that the initial classification be accurate as that constant attention be given to each individual in the group to find whether he is properly placed and to secure such treatment of each group as will suit the varying rate of learning and quality of attainment.

There are two somewhat distinct methods of treatment of the different groups. Both methods take as their basis the belief that the pupils in the bright group can achieve more in the same time than those in the other groups, and that they can, at the same time, do a better quality of work.

One method works on the theory that it is not wise for a pupil to proceed through school more rapidly than normal; *i. e.*, that he should take approximately a year to a grade so that he would be about 14 upon entering high school. Several arguments are brought forward in support of this: (1) Children below 14 are not old enough to get what they should out of high school, and under 18 are not mature enough for college work. (2) If allowed to go on rapidly they get out of the social group appropriate to their development. In their classes they are associated with young people who are older and more mature physically and socially. Consequently, they fail to secure the social

training they need; they will not be chosen on teams or be taken into clubs and will be handicapped in later life because of this.

Accordingly, there is provided what is called an enriched curriculum, so that in addition to the bare minimum essentials required of the slow or dull group, the bright group is required to do more—to read more literature, to do more experiments in high school science, to solve more difficult problems, to read more and more difficult Latin or French. But it is so planned that each group will reach the goal set for it—the end of the grade—at the same time. The bright pupil is also often, especially in high school, encouraged or compelled to take additional studies and to take more active part in student activities.

The second method provides distinctly for differences in rate of accomplishment and allows and encourages each group to progress as rapidly as its members can accomplish the work satisfactorily. Few schools adopt the latter plan wholly in the sense that they set the same standards for all groups. The usual plan is to provide higher standards of quantity and quality of work for the bright group, organize an enriched curriculum for them, and at the same time encourage rapidity of attainment. The chief difference between the two methods is that in the second the time is varied for the various groups as well as the quantity and quality of work. Each of these methods of treatment of homogeneous groups is used in many places. On the whole the results are very favorable and warrant continued trial.

It is impossible at present to evaluate accurately the

relative worth of the two methods described. There is, however, practically no tangible evidence that bright pupils who are allowed to progress more rapidly than the normal pale are actually handicapped in later life. The studies that have been made of the age of college graduates show that those whose names are in "Who's Who" were, on the whole, younger than normal at the time of graduation. There is also little evidence to show that younger students do not have as much opportunity for participation in clubs and other student activities in high school and college as older students. In the absence of evidence to show handicaps resulting from rapid advancement, we are warranted in assuming that they do not exist. On the other hand, there is definite evidence that compelling a bright student to keep pace with the slower student is harmful in developing habits of laziness and even of discouragement because of being held back. It is also extremely difficult to enrich many studies, like Latin and mathematics, without at the same time securing added power and advancement.

Several objections have been raised to the method of reducing differences by homogeneous grouping.

1. The dull group will lack the stimulus that comes from association with the bright pupils; they will become discouraged because of this and because of the consciousness that they are considered dull, and so will not try.

2. It is impossible to administer homogeneous grouping in a small school or in the upper classes of any school because the numbers are so small. A beginning Latin class numbering 75 students, and hence

large enough for division, may be so small, 25 or 30 in the senior year, as to make it impossible to provide for groups. Subjects listed as electives are often too small even at the start for division.

3. Teachers of the drill group become discouraged; they also lack the stimulus of the bright pupils.

The first objection is only theoretical and vanishes on trial. Stimulus comes not from being associated with people who can achieve what we can never even hope to achieve, but from competition with those who are relatively our equals, with whom we stand a fair chance. There would be no encouragement for most of us in being entered in a mile race with a man who could run the distance in 4.12, especially if we could do no better than 5 minutes. Before the first lap was completed he would be so far ahead as to make it uninteresting for him and for us. But if we were pitted against a group who could run the mile in about 5 minutes, our own time, we should then be encouraged because we should have a fair chance of winning the race, or at least, of making a creditable showing.

Experience has shown that discouragement is actually less in homogeneous groups than in indiscriminate grouping. This is so because the pace set, the quantity and quality of work demanded, is varied to suit the ability of each group. The habit of success is substituted for the habit of failure. The members of bright groups are encouraged to effort commensurate with their ability and are kept from developing habits of laziness and dependence. The methods of assigning lessons and the conduct of the recitation can be so varied that each group will receive the amount of help

and direction that it needs: the dull group being given more definite and detailed help, the bright group being thrown on its own resources more fully.

The second objection on the basis of administrative difficulties is much harder to meet, for they are real difficulties. It is true that financial considerations and teaching efficiency demand that classes be not very small. When a class is smaller than 25 it is doubtful whether it is advisable to subdivide it—indeed, it is impossible under the crowded conditions now obtaining in our high schools. The objection does not hold, however, in the elementary school nor in those courses in the high school that are required of all, except of course in the small school. Even though the plan could not be operated throughout the school, nevertheless it would still be helpful in those classes and courses where the numbers warrant it.

The third objection is usually due to the fact that teachers do not realize that a different standard of quantity and quality must be set up for each new group. They think in terms of the old average standard and become discouraged when the dull group accomplishes so little. This objection also results from the attempt to use the same method with the dull group that has proved satisfactory in the average or bright group.

Some teachers are much better adapted to teaching the dull group than others. Wherever possible, adjustment should be made in the assignment of teachers to the various groups so that those best suited to each group may be properly assigned.

Individualized Instruction.—Not satisfied with reduc-

ing differences, many schools are now trying out various plans of individualizing instruction. The two most commonly used are the "Winnetka Plan" and the "Dalton Plan." The former is used more often in the elementary school and the latter in the high school. Both resulted from the influence of Frederick Burke of the San Francisco Normal School, and were first developed in situations where the ordinary apparatus and school appliances were meager or entirely lacking. Each is founded upon the belief that individuals vary in rate and quality of performance. Each attempts to gauge individual achievement by individual ability. Each makes the assignment of work to be done an individual thing, a contract that is entered into by each student, as clear and definite as it can be made. The pupil works on this contract until he completes it satisfactorily, and then goes on to the next contract. Each plan involves definite individual assignments and definite tests for accomplishment, or some means by which the accomplishment of the contract may be definitely determined.

The Dalton Plan organizes all subjects on the individual contract plan and allows twenty days for the completion of all contracts in all subjects. If the student has not in twenty days completed all the assignments, he must work on those uncompleted before he is allowed to go on in any others. This is sometimes modified so as to allow advanced work in certain subjects before the completion of all the contracts. If a student completes all his contracts before the twenty day period, he is given new contracts.

The recitation as usually conducted is largely elimin-

ated. The classroom, libraries, and laboratories are considered as workrooms or laboratories for individual work. Each student consults reference books and teachers whenever necessary. When the student considers that he has completed the contract, he reports to the teacher for testing. He may work continuously on a contract in one subject until he is finished before beginning another subject, or he may distribute his time on all subjects. Charts of individual progress are posted in the room to show the progress of each student towards the completion of the contract. Each student is required to schedule his time each day and have this approved by his teacher. Usually group or class conferences are held every week where special points of difficulty are taken up or matters of general interest are discussed. The plan involves reorganizing the school program and demands very definite scheduling and careful supervision.

In connection with this plan, homogeneous grouping is often used, so that contracts are varied according to the abilities of the various groups of students.

The Winnetka Plan varies from the Dalton Plan in several particulars. It distinguishes between subjects used as tools and subjects used as socializing agencies, appreciation, etc. The tool subjects are individualized but the other subjects are still taught in groups or classes. Usually the morning is given over to tool subjects and the afternoon to the other subjects. The tool subjects, writing, arithmetic, the mechanics of reading, etc., are completely individualized. That is, individual contracts are given and each pupil is allowed to take his own pace in each. With some supervision

each pupil may go on in each subject as rapidly as he may be able, regardless of the other subjects. He is given exercises of various kinds and trial tests by which he tests himself. When he finds that he has mastered the material, he goes to the teacher for the final test. If he passes this he is at once given a new contract. No conferences or group recitations are held in the tool subjects; each pupil works by himself and no definite time is allotted for the completion of the contract. Textbooks have been written, exercises and self-administering tests have been worked out for each of these subjects.

The other subjects, literature, art, music, some parts of history and geography are still taught by the conference or group recitation method, since the values peculiar to this group of subjects can best be obtained only in social groups and by social contacts.

It is yet too early to judge accurately the value of these methods of individualizing instruction. They each contain much that is helpful and suggestive. The few studies that have been made of the effectiveness of the plans seem to indicate that they are more helpful to the slower students than to the brighter ones. This may be due to some fault in the method of administering the plans rather than to the plan itself. Many modifications of these plans are in operation in various places, but the essential features are as described.

These various methods of providing for differences among pupils show that our schools are alive to the importance of the question and are working toward a real solution, even though we are still far from its

actual accomplishment. They at least emphasize the fundamental place of the individual as a basis for the educational process.

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CHAPTER XII

GUIDANCE AND ITS PLACE IN EDUCATION

The previous discussion has shown that education is an individual process. It consists in making certain changes in each individual. Individuals vary tremendously in almost every known quality and characteristic. Thus individual variation necessitates differences in treatment and differences in objectives or ends to be reached. Society, too, is becoming increasingly complex and demands increasing specialization on the part of various individuals. This indicates again the necessity for variation in ends and in treatment.

This increasing complexity and the variation in individuals have profoundly affected education and have served to emphasize the importance of the guidance aspect. It will be the purpose of this chapter to describe briefly the purpose of guidance and its place in our system of education.

The Nature of Guidance.—Guidance is not a simple process to be described in a sentence. It is one aspect of education and has all the complexity of education. As we have seen, education is concerned with the training and development of individual human beings. In general, it seeks to secure the highest development of each individual and to fit him for effective participation in various social activities on those levels where he can do his best work. In achieving these objectives,

two factors must be taken into account—the individual and society. The individual is the starting point: he is the one to be educated, the one in whom the changes we call education must take place. He must form certain habits, develop certain skills, attitudes, and ideals. It is the function of society to determine in large measure what these habits, skills, attitudes, and ideals shall be. There are certain social needs that must be met, there are certain things that individuals must be trained to do in order to provide and maintain an efficient social organization.

Guidance the Selective Aspect of Education.—A large, possibly the largest, part of education, considered from the standpoint of time and energy expended, is concerned with the formation of habits, the development of skills, attitudes, and ideals in individuals. But this is by no means all of education. Education is not only formative; it is selective. If all people were exactly alike in native ability and in physical and mental make up, if everyone had to form and develop the same habits, skills, attitudes, and ideals, the task of education would be greatly simplified. Methods could then be easily developed that would be extremely efficient. Education would then be non-selective: it would be purely formative.

But individuals are not alike. We have seen how widely they differ in regard to almost every known category: in physical health and strength, in mental qualities, in intelligence, in special aptitudes as well as in racial and religious ideas, and in home conditions. On the other hand, social needs are almost infinitely varied. Industry is becoming more and more spe-

cialized; we need a great diversity of workers, not only in various occupational lines, but in citizenship and governmental activities as well. We cannot train all people alike, if we would; and we must not, if we could. Education must then be selective. There are, to be sure, certain fundamental habits that should be the common possession of every one in a democracy, but beyond these common factors the variety is infinite. In this complex social organization of ours we need many different types of workers; we can use every kind and degree of skill and intelligence. We have a place for the broadly trained, highly intelligent manager, and for the skilled specialist whose deft touch is utilized in a narrow field.

One of the most important aspects of education is that of discriminating between individuals with their varying capacities, abilities, aptitudes, and interests, and of so arranging our social system that each one will choose, prepare himself for, and find that place in society where he can serve best and at the same time attain his own best development. This is the guidance aspect of education. It is concerned with times of choice, times when the ways part, when it is necessary to make a selection of one course of action or another. Fundamentally any aid, directly or indirectly given, which helps in any choice is guidance, whether this is a choice between going out with umbrella and raincoat or without them, or between beef and pork for dinner, or between the Home Economics Course and the College Preparatory Course, or between the vocation of the physician and that of the carpenter. Any help given for any of these choices is guidance, whether by

way of a long period of preparation or by definite advice given at the time. It is thus one of the absolutely essential aspects of education. In one sense, it is one of the most important objectives of education. Every day is a day of choice, and to be prepared to make intelligent choices, whether of cereal at breakfast, or of mayors, governors, and presidents at election time, is to be truly educated.

Guidance should not be thought of as primarily an activity of the teacher or the counselor. It is, as all other parts of education, essentially an activity of the individual himself; or, at least, the definite purpose of guidance is to produce some activity, or choice, on the part of the individual. It is always the individual who chooses for himself. Our function as teachers and guides is so to arrange situations that the pupil will have all the facts and experiences necessary for a choice. In such case, advice is not needed. In many cases, giving advice is a confession that the work of guidance has been poorly done.

Guidance an Essential Part of Education.—Interpreted thus, guidance is interwoven with every part of education and, like education, it is by no means confined to the school. Every act, every situation, every experience in life is or may be educative. Education is by no means confined to the more or less formal, definitely organized work of the school. Children receive a very important part of their education at home, on the street, at the movies. But we cannot depend upon these to achieve the objectives of education. In order to make sure that certain habits are formed and that certain skills and attitudes are developed, we

single out certain of these for special emphasis, and we place in the hands of experienced teachers the duty of seeing that these ends are realized. It is the same with guidance; every activity of the school helps or should help the pupils to choose wisely.

Critical Times of Choice.—There are certain choices of vastly more importance than others: these may truly be termed crises in the life of the individual, the places where the parting of the ways is more pronounced, where the choice is more vital to the whole after-life of the individual and to society as well. Among such crises are the choice of leaving school for work at the age of 14 or 16; the choice of the curriculum in the high school; the choice of going to normal school or college, or of not going at all; the choice of a college; the choice of life work; the choice of specialized citizenship activities; even the choice of a wife or a husband. All of these are of unusual importance for good or ill. They, therefore, need special attention, special preparation for, and special organization. Whether any or all of these, or many others, shall be definitely provided for in our schools depends largely upon whether we consider them really important, and whether our schools can be so organized as to give effective help.

Let us distinguish, then, clearly between the two aspects of education—the selective aspect and the formative aspect. Guidance is concerned with the selection, the choice of habits and skills to be developed, and not primarily with the formation of habits. To be sure, the way in which a person forms a habit, the degree of skill that he attains is extremely helpful in

proper guidance; this helps in diagnosis, and diagnosis is the first step in guidance, but the actual formation of habits is not in itself guidance. A physician examines a man, he diagnoses his case, and he suggests certain exercises—all this is guidance; the actual performance of the exercises is not guidance, but is like the habit formation aspect of education. A part of the examination may well consist of certain exercises that will enable the physician to judge better the action of the heart and muscles, but this is a part of the diagnosis and hence, of guidance. Guidance studies and analyzes individuals with their varying capacities, abilities, and aptitudes; it studies, analyzes, and lists social needs in all their complexity; and it seeks to organize education and arrange experiences of individuals so that each individual will form those habits, develop those skills, attitudes, and ideals, and choose those lines of activities that will be best for himself and for society.

As has already been said, it is impossible to separate these two aspects, just as impossible as it is to separate reading from geography, or physics from mathematics, but it is helpful and necessary to single out this one aspect, guidance, for special treatment. It is of especial importance just now because attention is being directed as never before toward individual differences and their causes. This question is being very carefully studied, and we are generally realizing that it is of very great importance that all differences between individuals should be recognized, and that many of them should be utilized and developed. We believe that this will necessitate a radical change in

our educational system and in our methods of instruction. While it will not and cannot solve all educational problems, it should be of material assistance in improving conditions. Guidance, then, is the diagnostic, the selective aspect of education.

Kinds of Guidance

What, then, are the different forms of guidance and just how are they related? Guidance, like education, is unitary, but it is helpful to single out now one phase, now another, for special consideration. In the discussion of the objectives of education from the Cardinal Principles of Education,[1] four lines of activity are described in which every normal being engages: vocation, home membership, citizenship, and leisure time. While these do not cover all human activities, they are sufficiently inclusive for our purpose. If these are the objectives of education, we can properly speak of the organization of work which is calculated to attain a certain objective as that sort of education. For example, if the work of the school is so organized as to attain the end of citizenship, we would call this civic education. We could then distinguish in the same way civic guidance, and say that when individuals are diagnosed and civic needs are analyzed, and the effort is made to have the individual select habits and attitudes which he will form and develop, and choose civic activities where he can be of the most use to the state and to himself, this is "civic guidance."

Vocational Guidance.—At present one of the objec-

[1] U. S. Bur. of Ed. Bul., 1918, No. 35.

tives commonly singled out as worthy of special consideration is vocation. When the work of the school and of society is so organized as to provide definite training that fits a person for a vocation, we call it vocational education. In the same way we can separate out vocational guidance. Vocational guidance, then, is primarily concerned with the diagnosis of individuals with reference to the job. It has continually in mind the job and is concerned primarily with health, character, home membership, citizenship, or self-development, only as these will help in the job.

Vocational guidance is, then, only one phase of guidance but a very important one. There is unquestionably grave danger in the narrow vocational point of view. The job, while important, is not all-important, and if we confine our attention too narrowly to the job, we shall be very likely to have a one-sided view of the individual and neglect the other very important obectives mentioned. Vocational guidance, like vocational education, is more easily organized and more definite in its objectives than some other form of guidance, and for this reason more time has been given to its organization than to that of other forms of guidance.

We cannot here describe the ramifications of vocational guidance nor the methods commonly used in its development. The purpose of vocational guidance has been defined as an effort "to assist the individual in choosing, preparing for, entering upon, and making progress in an occupation." [2] It is thus seen that vo-

[2] U. S. Bur. of Ed. Bul., 1918, No. 19, *Vocational Guidance and the Secondary School.*

cational guidance is a continuous process that begins before the individual chooses his occupation and continues long after he has entered upon it. The methods used consist in helping each individual (1) to secure the facts about various occupations that are essential to an intelligent choice, (2) to find what his particular abilities and interests are, and (3) to give him experiences of such a nature as will enable him to decide whether he wishes to enter a given occupation or not.

Curriculum Guidance.—Other crises equally important are concerned with the choice of a curriculum in high school or the choice of electives. If the individual is to receive the education that will be for him most efficient, we must in some way arrange it so that he will choose his high school curriculum wisely.

Schools are more and more giving definite and helpful information and suggestions to students before they enter high school. The entire high school program of studies is examined, and an attempt is made to show the prospective student what the high school has to offer and what the purpose of each curriculum is. Especially in the junior high school are we providing facilities for learning more about the next step in education. One of the purposes of the junior high school is so to organize the work that the transition from elementary school to high school is gradual and that provision will be made for trying out and for exploration in the various branches of high school work. This is done in order that the student may know what the various subjects really are and that he may find more about his own interests and abilities.

School Guidance.—Closely allied with curriculum

guidance is guidance in the choice of a school. The choice may be the high school or a business college or a private school; it may be college or normal school or the particular college desired. All these call for definite help and guidance. Many schools now have on file catalogs and announcements of various schools and colleges, and help is given in securing additional information regarding each type of school. In a few instances this is gathered together in a useful pamphlet or book and furnishes a very convenient and useful guide for teachers and students.

Other Forms of Guidance.—Schools now recognize that guidance is necessary in connection with every phase of educational objective. Help is given in crises connected with adjustment of school and teachers, in choice of clubs and activities, in social and moral conduct, and in the wise use of leisure time. No crises in the lives of boys and girls is considered too small for intelligent guidance.

Another question is, when shall guidance be given? Should it be given only at the time when the individual is confronted with the necessity for a choice, or can it be given earlier? Guidance is concerned with choice, it has to do with crises, and as such it should help at the time when a choice is to be made. But the best kind of guidance is the kind that prepares one in advance for the choice; it forecasts the crisis and paves the way for intelligent choice. It helps the individual to secure the data necessary for an intelligent decision.

The Method of Guidance

Should we give advice to young people or content

ourselves with presenting facts to them, with the work of preparation already described? It is usually true that the more one has tried to give advice at the times of choice, the more he shrinks from it and the less reliance he places in advice. In general, the better the preparatory work has been done, the less necessity will there be for actual advice. Of course, we cannot entirely escape responsibility for giving advice, but when we do give it, it should always be buttressed by actual facts and experiences.

It hardly seems necessary to discuss the question of compulsion as a method of guidance. Clearly it is no part of the purpose of guidance to choose for a person what he shall do, to prepare him for it, and to make him do it. This is never desirable nor permissible as an educational process. In times of great national crisis, as in the late war, this method may, of course, be not only desirable, but absolutely necessary. And it might also be desirable as a method of training in an autocracy, but never in a democracy where the ultimate purpose is the good of each individual citizen. We shall continue to employ negative prescription in certain lines of work where we refuse to allow a person to perform a certain activity if he lacks the qualities or the skills necessary to do it successfully. Thus we shall refuse to allow a man who is color blind to become a locomotive engineer. We may refuse to allow an osteopath to practise medicine because he has not prepared himself in *materia medica.* We do not allow a person to teach in our public schools unless he has a certificate that is supposed to guarantee a certain minimum training. This field of negative pre-

scription will inevitably be enlarged whenever and wherever public safety or the public good demands it. But this is far removed from positive compulsion. We may surround an individual with forces that will predispose him to a certain choice, we may give him the facts and experiences that should enable him to choose intelligently, but, in the last analysis, he must make his own choice. The purpose of guidance is intelligent self-guidance. This only is democratic; this only is educative. This is the point at which so many people fail. They are so afraid that the boy will make an unwise choice that they cannot let him alone. They fail to realize that efficiency is not the chief purpose of democracy: it is the development of character. Character cannot be developed except by responsibility, and is any real choice between a lower and a higher, there responsibility is dependent upon choice. When there is always the possibility of choosing the lower. But it is only thus that we can accomplish the purpose of education in a democracy. Guidance aims only to assist the individual to choose wisely.

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CHAPTER XIII

THE USE OF STANDARD TESTS AND SCALES IN EDUCATION

The Development of Measurements.—One of the most striking characteristics of the educational development of the first quarter of the twentieth century is that of measurement of educational products. This movement, slow in its beginnings, has progressed with increasing rapidity and has sometimes overshadowed other important educational questions.

We now have scales for measuring skill in handwriting and in drawing, for determining facility in written composition, for appreciation of poetry, and for mental ability. There have been developed standardized tests in practically every subject offered in our elementary and secondary schools: tests for mechanical ability and for mental ability or "intelligence."

The Significance of Tests and Scales.—What significance have these tests and scales for education, and how can they be used to assist in the process of the education of the individual? Briefly their chief significance may be summed up in these statements: (1) Education is the process of making and preventing changes in individuals. (2) Tests and scales are instruments by means of which we can determine objectively where and to what extent the desired changes have actually been made. To a less extent, they assist in determining what changes can be made in each in-

dividual in so far as they can distinguish between varying abilities.

Their effectiveness depends upon the following questions:

1. To what extent do they test all the desired changes?

2. How definitely and accurately do they test the changes they profess to test?

3. Are they adapted to use in the classroom under ordinary conditions?

It is frankly admitted by all that no tests have yet been devised that test all desired educational outcomes. At present only the most formal outcomes, certain habits and skills, can be tested, and these not always accurately. Definite progress has been made both in devising tests that will cover a wider field of educational outcomes and in perfecting tests now in use so that they are more accurate and valid.

They have already proved to be extremely valuable to the teacher and administrator. If the purpose of education is to make certain changes, to form habits, develop attitudes and ideals in individuals, then anything that enables the teacher to determine when these changes have actually been made should be of invaluable assistance. The fact that all the desired changes cannot be tested in this way merely limits their use: it in no way invalidates their use for measuring those changes, habits, and attitudes which can be tested. Obviously, if a teacher can know when certain habits have been formed, he can then go on and attempt to secure other desirable outcomes.

Dangers in the Use of Tests.—The principal danger

in the use of tests is that teachers will spend all their time and energy in attempting to secure those outcomes which can be measured, and neglect other valuable outcomes. Exactly this has happened in many cases where the principal or superintendent has judged the success of the teacher solely by the results of the standardized tests and scales. Naturally, when this is the case, teachers will spend their energy in teaching those things called for by the tests. They are usually the habits and skills that lend themselves most easily to formalized drill methods. Some contend that this method will give the most desirable general results because the teacher who secures the best results in these more or less formal aspects will also secure the best results in character, appreciation, ideals, and the like. Some recent studies seem to show that this is by no means certain: that methods suited to formal ends are not always efficient in developing attitudes and appreciations. Teachers should continually be on their guard against spending their whole time and energy on accomplishing those results that can readily be measured.

Another danger in the use of these tests is that of judging the efficiency of teaching by the average or median achievement of the class or group. This may at times be justifiable for the principal, but never for the teacher. It should again be emphasized that education is an *individual* process. Each pupil should be considered *by himself.* His achievement must be considered with reference to his ability and his previous achievements. Any tests should be considered as a test of each individual in the class, not merely a test

of the class as a whole. Charts of *individual progress* are of far greater importance in teaching than charts of class progress, helpful as these may be at times.

Tests and scales are very helpful as a means of self-diagnosis and help for each pupil. He can see his own achievement in comparison with that of others and can thus judge for himself what he has accomplished.

Intelligence Tests.—Intelligence tests are somewhat different in purpose from other standarized tests and perhaps should be treated briefly by themselves. They are of two general kinds: "individual tests" and "group tests." Individual tests are chiefly like the Simon Binet tests where the individual is given a test by himself, such as assembling and arranging a "puzzle picture." The child is observed carefully while he is putting the picture together. The observer notes the total time it has taken the child to accomplish the task and also notes carefully how he goes about it, what he attempts, how many pieces he rejects, etc.

The group tests are tests, usually written, given to an entire group or class. Some of the common ones are the Army Alpha and Beta, Terman, Thorndike, etc. In these tests, the results only are taken into consideration, and each child is graded on the basis of the number he attempts and the accuracy of his results. No account is taken of his method of work.

Each of these types of tests test the individual, of course, and should be considered as individual tests. The chief differences are: (1) In the "individual" tests, like the Simon-Binet, the test is given to each individual separately, while in the "group" tests, the

test is given to every one in a group at the same time. (2) In the "group" test, the results only are considered. In the "individual" test, both the results and the methods used by the child to accomplish the result are taken into consideration. These tests are designed to measure "mental ability." Mental ability is a very complex and indefinite something that represents, or is supposed to represent, ability to do certain tasks, to perform certain operations which require thinking. This is often called "intelligence." In this sense, intelligence is native capacity as acted upon and developed by one's experience, his education, his training. Thus, at any given moment one's intelligence is the product of these two forces: (1) What he is by nature and (2) what his environment has been. Tests cannot at present test native capacity alone, nor can they test experience alone; we can only test the product.

We can, however, gain a rough idea of differences in native capacity by measuring the achievement of two individuals who have had relatively the same experience. We can also gain some idea of relative native abilities by measuring the rate of learning.

Whatever it is that these tests measure, it is very clear that there is a striking correspondence between the results of these tests and ability to do school work. We can be fairly sure that those who rate high in the intelligence tests will be able to do excellent work in school, and that those who rate very low will usually not be able to do excellent work in school. These statements are not of universal application, however, for it has been clearly proved that other factors greatly

influence school achievement. Perseverance, interest, good health, high ideals, and other traits may, by their presence or absence, profoundly affect achievement in school. The relation between score in intelligence tests and ability to do school work is so clear that we are warranted in using them for purposes of diagnosis. If a pupil scores high in these tests and is low in school work, he should be studied carefully in order to discover what is wrong. It may be his home influence, his health, his teacher, or poor foundation. It may be that his score in the test was not an accurate measure of his real ability.

The same danger lurks in the use of these tests that was pointed out for the other tests—that of losing sight of the individual in the measurement of the class as a whole. The point cannot be emphasized too often that all tests and measurements must be interpreted in terms of the status of each individual; for education is an individual process.

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CHAPTER XIV

THE PLACE OF THE TEACHER IN THE PROCESS OF EDUCATION

The discussion in the preceding chapter has made it clear that the only really active factor in the education of any individual is himself. Education is absolutely dependent upon what each individual does for himself. It is measured only in terms of what each individual has accomplished in and for himself. What, then, is the place of the teacher? In this chapter we shall bring together the principal suggestions already given regarding the work that the teacher can do.

The Teacher Not a Maker of Habits.—In our somewhat exaggerated notion of the rôle of the teacher, we often speak of him as one who "passes down to the child the inheritance of the race," or who "develops ideals and forms habits" in the children. In the light of our previous discussion, this no teacher can do. In fact, teachers sometimes meddle altogether too much with the process by which students acquire habits, and thus actually interfere with education. Habits are formed only by the individual himself. Parents and teachers, in their desire to please, help, or encourage the child, sometimes excuse him from certain tasks or even do the tasks for him, not realizing that this is the worst possible thing for the child, for they hinder his development by depriving him of the very thing that makes achievement possible. We grow by doing:

we increase our strength by activity. The inevitable effect of inactivity is physical and mental atrophy and death. Good education results only from worth while activities, conscientiously performed.

The Teacher a Purveyor of Facts Not a Dispenser of Knowledge.—The teacher is not a dispenser of knowledge; he is a purveyor of facts. He may be very learned and be intimately acquainted with sources for facts of all kinds, but this will not insure learning on the part of his students. Many a man has sat at the feet of a Socrates, a Plato, or a Gamaliel and gone away as ignorant as before. All the wisdom of Solomon was foolishness to him. No one can absorb facts by mere contact with another as a sponge absorbs water. Teachers do not radiate knowledge as a fire radiates heat.

There is no way known by which we may learn facts or acquire knowledge except by hard, unremitting work. The teacher may act as a purveyor of facts: he may set them in tempting array before his students as a caterer sets before the diners all kinds of delectable foods; but these facts are all worse than useless unless the student learns them, *assimilates them* for himself, just as the food is useless unless it is eaten and digested.

Schools and colleges may be endowed with millions; they may have splendidly equipped laboratories and well stocked libraries, but for all this, they may be poverty-stricken *institutions of learning* unless the students have a desire to learn and a willingness to work hard. "Better a log school house and poor equipment with eager students than splendid buildings filled with

books and modern apparatus where there is no thirst for learning." On the walls of a western high school are these mottoes: "There is no electric elevator to success. Step up the stairs, don't stare up the steps." "Success comes in cans, failure comes in can'ts. Some say 'I can' and they will. Others say 'I can't' and they wilt, and that's the difference between success and failure."

A teacher may assemble facts, may present them in an attractive way, but unless the students, through his inspiration or in some other way, reach out and appropriate the facts, they will learn nothing.

The Teacher Not a Dictator.—The teacher is not a dictator. He does not arbitrarily decide on what he wants his pupils to do or to become and then force them to do it. There is still some aspect of compulsion in our schools, and possibly this may always be necessary. We cannot always depend upon children to do those things that will result in useful habits voluntarily, without some direction. Taken by themselves, present interests of children are very unsafe guides for determining desirable outcomes or even methods of procedure. The necessary conditions under which education is attained are those that will ensure individual effort. Effort put forth by any individual on a task is most efficient for purposes of education only when it is done in response to an inner urge to do it. It is the least efficient when done under compulsion. Some education does result from activity performed under compulsion, actuated by fear; this is at times the only way we can get the work done, but it never gives the best results. The rôle of the teacher is not primarily

or predominantly that of a slave driver, a dictator.

The Teacher a Guide.—What, then, is the place of the teacher? He is a guide. He knows, or should know, much more clearly than the pupil what the destination is, what is the end of the road, what is to be accomplished. He knows this because he has been over the route before and because it is his specific business to know; it is a part of his equipment as a teacher. The teacher has also studied the various routes by which the destination is to be reached. His part is to disclose to the pupil, as clearly as may be possible, the destination, the objective to be reached, to suggest to him the best and most desirable routes, and what he will have to do in order to reach the goal aimed at. The educational course of a child through school is a personally conducted journey with the teacher in the rôle of a guide. There are guides and guides. Some do too much directing and too much talking—they leave nothing for the tourist to do except look; they even try to direct his thoughts, his attitudes, and his feelings. These are not the best guides; they will be sufficient for the lazy, for those who want nothing except the name of having visited such and such places and having seen such and such things. But for those who really want to get the most out of such a tour, another kind of guide is necessary. Such a one will never be prominent. He will arrange the tour in such a way that the most interesting and instructive things will be seen, the most important places will be visited, but he will leave as much as possible to the individual tourist; he, himself, will remain in the background. It is not the guide whom the tourist wishes to see and

hear; it is the places of interest and the notable people. It is not the feelings of the guide that he wishes to absorb. The purpose of your tour is to gain your own impressions, to develop your own attitudes. The best the guide can do is to see that you are brought face to face with places and people under favorable circumstances. If he does any more than this, he limits rather than promotes the development of the tourist, and so defeats the very purpose of the tour. The real guide keeps continually in mind the purpose of the tour, which is the enjoyment and development of the tourist. It is what the tourist gets out of the journey that counts, and only that.

So the teacher must continually keep in mind the purpose for which he is working—the training and development of each child. He must have clearly in mind the goal to be attained by each child; he must be well acquainted with the most desirable routes—the organization of studies and methods of procedure—and he must suggest and direct in such a way that the pupil secures the maximum development. He must, therefore, be content often to remain in the background, to be invisible even, in order that the educational process may go on most effectively. Another thing he must do that guides seldom even attempt—if indeed they could accomplish it though they tried—he must do what he can by tests and measurements to discover whether the pupil has actually attained the desired goal; whether the habits and skills have been developed, the attitudes and ideals formed, the appreciations secured. If they have not, the route must be gone over again or other tours arranged until the objectives have been attained.

The Teacher a Trainer.—Another helpful conception of the function of the teacher is that of the trainer. The one who is a trainer of animals has certain rather definite methods of procedure that he follows.

He first selects for each animal the tricks or habits that he wishes it to learn. He then proceeds to the teaching process. The first step is to get the animal to do something that will lead to the development of the habit desired. If the animal refuses to do anything or the specific thing necessary, it cannot be taught the trick. The trainer must arrange the situation in such a way that the animal will do the thing desired. Accordingly, the stage is set very carefully so that the thing to be done, jumping on a chair we will say, is obvious. In the case of domesticated animals, this process is materially shortened if the trainer can in some way convey to the animal the thing *he wants* done. Horses, dogs, elephants, and other animals which have real affection for their trainer respond very quickly to such suggestions. Undomesticated animals often are harder to train because they have no desire to do the thing the trainer wishes and must be forced to do it by fear of punishment. Step by step the trainer gradually develops the necessary parts of the trick, and by repeating the acts over and over again perfects the various parts until the trick is ready for presentation. Another necessary part of the procedure is that of rewarding the animal when the desired act is performed. This is found to hasten the process. When the trained seal or horse successfully performs its act it is usually rewarded by some delicacy. In the case of some other animals, the dog and the elephant,

this is often unnecessary; the praise of the trainer indicated by "good dog," a pat of the hand, or in some other way is sufficient. This is not the usual method in the case of the lion, tiger and leopard: more frequently the only incentive used is the negative one of the whip to keep the animal from doing what is not wanted, and to induce him by fear of punishment to do what is wanted.

The teacher occupies in some respects the same place in the training of children as that occupied by the trainer of animals. He has clearly in mind the thing that is desired. He must usually lead up to this objective gradually by intermediate steps; he must in some way induce the pupil to do something that will lead to the desired result, and he must use rewards and punishments as helps. The greatest asset the teacher possesses, as compared with the trainer of animals, is his ability to make clear to the pupil what he wants him to do. That is possible both because of the intelligence of the pupil and because we have a spoken and written language that we use as a means of conveying thought.

The teacher may often profit by the methods used by the trainer of animals in making his objectives more definite, in securing the desirable activity on the part of the pupil, in increasing his patience and persistence, in insisting that the training be continued until the necessary skill has been acquired.

The Point of View of the Teacher.—The conception of the rôle of the teacher as a guide and trainer indicates a certain viewpoint that the teacher must take in the education of children.

In the first place, he must look upon education as a process in which the child who is being educated is the only really active agent. In some way, the teacher must induce or bring out activity on the part of the child. The only materials for such activities are found in the instinctive equipment of children as modified by pre-school experiences. These tendencies to do, to think, to feel, are the raw materials from which education is produced by the teacher or by means of which education is achieved by the individual child. After activities have been induced, the point of view of the teacher is that of directing activities into useful channels, guiding, suggesting, rewarding, punishing in such ways as to enable the child to form the desired habits, to learn the necessary facts, to develop the essential attitudes. Finally, the teacher must look upon the creation,—the child, and "all that in him is," and "see that it is good"; he must measure it, test it, and, if it is not good, induce such other activities as will ensure that it is good. He must always remember that skills, appreciations, habits, attitudes, goodnesses are developed only in individuals, and education can be measured only by these developments as they actually occur in each individual child.

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